

Everyman's Encyclopædia

IN TWELVE VOLUMES

VOLUME TEN
**Nyasaland
Protectorâte
TO
Raglan**

THE THIRD EDITION

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EVERYMAN'S ENCYCLOPÆDIA
IN TWELVE VOLUMES

VOLUME TEN
NYASALAND PROTECTORATE—RAGLAN

EDITED BY ATHELSTAN RIDGWAY, LL.B.

THE THIRD EDITION

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RETROCONVERTED
B. C. S. C. L.



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ABBREVIATIONS

The titles of subjects, which are printed first in bold type, have been abbreviated within each article to the initial letter or letters.

ac., acre(s).
agric., agricultural.
ambas., ambassador(s).
Amer., American.
anct., ancient.
ann., annual.
arron., arrondissement.
A.-S., Anglo-Saxon.
A.V., Authorised Version.
b., born.
Biog. Dic., Biographical Dictionary.
bor., borough.
bp., birthplace.
Brit., British.
C., Cer+trade.
c., about.
cap., capital.
cf., compare.
co., county.
com., commune.
cub. ft., cubic feet.
d., died.
Dan., Danish.
dept., department.
dist., district.
div., division.
E., east; eastern.
eccles., ecclesiastical.
ed., edition; edited.
e.g., for example.
Ency. Brit., Encyclopedia Britannica.
Eng., English.
estab., established; establishment.
F., Fahrenheit.
fl., flourished.
fort. tn., fortified town.
Fr., French.
ft., feet.
Ger., German.
Gk., Greek.
gov., government.
Heb., Hebrew.
hist., history.
horticult., horticultural.
h.p., horse-power.
hr., hour.
i.e., that is.
in., inch(es).
inhab., inhabitant(s).

is., island(s).
It., Italian.
Jap., Japanese.
jour., journal.
Lat., Latin.
lat., latitude.
lb., pound(s).
l. b., left bank.
long., longitude.
m., mile(s).
manuf., manufacture.
min., minute(s).
mrkt. tn., market town.
MS., manuscript.
mt., mount; mountain.
N., north; northern.
N.T., New Testament.
O.E., Old English.
O.F., Old French.
O.T., Old Testament.
oz., ounce(s).
par., parish.
parl., parliamentary.
pop., population.
prin., principal.
prof., professor.
prov., province; provincial.
pub., published; publication.
q.r., which see.
R., riv., river.
r. b., right bank.
Rom., Roman.
R.V., Revised Version.
S., south; southern.
sec., second(s).
sev., several.
Sp., Spanish.
sp. gr., specific gravity.
sq. m., square mile(s).
temp., temperature.
ter., territory.
tn., town.
trans., translated; translation.
trib., tributary.
univ., university.
urb., urban.
vil., village.
vol., volume.
W., west; western.
Wm., William.
yd., yard

The article ABBREVIATIONS contains a list of those in general use. See also ABBREVIATION (music) and ELEMENTS (chemical symbols).

N

Nyasaland Protectorate, strip of ter. about 320 m. in length and varying from 50 to 100 m. in width, lying approximately between lat. 9° 45' and 17° 16' S., and long. 33 and 36 E. Recent survey puts the area at 17,949 sq. m. (land area 37,374 sq. m.). Pop. Europeans, 2500; Asiatics, 3350; natives, 2,300,000. N. P. comprises the W. shore of Lake Nyasa, with the tablelands separating it from the basin of the Loungwa R., and the region lying between the watershed of the Zambezi and Shire Rs. on the W., and the lakes Chiuta and Chilwa and the Ruo R. (an affluent of the Shire) on the E., including the mt. systems of the Shire highlands and Mlanje. N. P. is bounded on the N. by Tanganyika Ter., on the S. and E. by Portuguese E. Africa, and on the W. by N. Rhodesia. N. P. is administered under the Colonial Office by the

quired into the possibility of closer union between the Rhodesias and N. P., but the chief obstacle to federation lies in the existence of large native areas calling for special treatment and so far no action has been taken. The policy of indirect rule has met with some success in N. P. Experience shows that tribal institutions have more vitality there than was believed, and that chiefs still exercise an authority which can be used to good purpose; but the system is still in the experimental stage, particularly in regard to financial responsibility. The Protectorate is divided for administrative purposes into three provs., each of which is in charge of a prov. commissioner. The chief tns. are Blantyre, with about 600 European inhab., Limbe, near Blantyre, and Zomba, the seat of the gov.

Climate and Products. The climate of N. P. in its essential features is similar to that of the rest of S.E. Africa within the tropics. The monsoon commences to blow strongly in Sept., and the first rains may be expected any time after mid Oct. From their commencement to the end of Dec. it is usual to experience violent thunderstorms and heavy precipitation in a few hours, followed by an interval of intense heat. Malaria is prevalent, especially after the rains, in many parts of the country and occasionally is contracted in unexpected places, even in the highlands. Leprosy is prevalent in N. P. and there are twelve clinics administered by missions and assisted by gov. grants. Medical services are well organised, with a large African staff and a number of Asiatic surgeons. There are 2 European hospitals, 15 native hospitals, and 100 rural dispensaries.

There is no mineral development in N. P. as there is in Kenya or Tanganyika, though there are unexploited bauxite deposits on the Mlanje plateau; and almost the whole of the £2,760,000 worth of exports of local products (1917) was derived from agriculture. Labour in E. Africa is attracted to mining in S. Africa and N. Rhodesia, the result being that the proportion of natives seeking work in other parts of the continent has created a problem of grave concern to the gov., lending, as it does, to a reduced taxable capacity and to detribalisation. Tobacco is the crop most favoured by Europeans. It was first planted in 1889 and exported in 1893, and is grown by Europeans and natives in a proportion of about one to five; in 1917 20,007,732 lb. were exported. Tea is cultivated, the acreage in 1917 being 20,788. Coffee, grown on 17,000 ac. in 1900, is now grown only on 21 ac. The acreage planted to cotton has declined owing largely to the depredation of pests. More interest is now being shown in the crop as a rotation for tobacco rather



E.N.A.

NYASALAND: A MOTOR ROAD SKIRTING THE BASE OF MLANJE PEAK

governor, assisted by an executive and a legislative council, both consisting of nominated (as opposed to elected) members, the governor having the right of veto on ordinances. In 1937 a royal commission under Lord Bledislowe in-

than as the main crop. The most suitable areas for cotton on a large scale are at lower elevations where the climate is hot and trying for Europeans. Over 3,000,000 lb. were exported. Other crops include sisal, maize, ground-nuts, rice, pulses, and tung oil. N. P. is comparatively well wooded, the forests occupying 11·8 per cent of its area. The area of the forest reserves is about 2600 sq. m. and cover the chief catchment areas and watersheds. There are a number of African foresters and forest guards and forestry is for the most part administered by the native courts. The value of exported timber averages £25,000 annually.

Communications.—The port of entry to N. P. is Beira in Portuguese E. Africa, which is also the most convenient port of entry for Rhodesia. There is a 3-ft. 6-in. gauge railway system extending from Beira (Portuguese E. Africa) to Chipoka on Lake Nyasa (496 m.), crossing the Zambesi R. at Sena (199 m.) by the Lower Zambesi bridge and passing through Murrumbidgee, Port Herald, and Blantyre (353 m.). Main roads and 'carrier' roads are open all through the protectorate, the total mileage being 3400. N. P. is connected by telegraph overland with the Cape via Salisbury. Rhodesia and Nyasaland Airways operate regular services between Blantyre and Fort Jameson via Lilongwe and between Blantyre and Beira. There are large aerodromes at Chilika (11 m. from Blantyre), Zomba, and Lilongwe.

Education. The course for native authorities at the Jeanes School at Zomba represents a modern attempt to deal with the problem of training chiefs in their new duties. The attendance at European schools in N. P. has, however, diminished rapidly since 1935, when S. Rhodesia abolished all tuition fees and extended this privilege to children from N. P. In 1947 there were over 4000 native schools, and two secondary schools for Africans.

History. Livingstone, at the head of a gov. expedition, reached the S. shore of Lake Nyasa in 1859, and this visit resulted in the founding of various missionary societies. The activities of these bodies were followed in 1883 by the formation of the African Lakes Corporation, and two years later the first Brit. consul was sent out. Opposition by the new settlers to the slave trade carried on by Arab coastmen and natives settled at the N. end of Lake Nyasa resulted in a conflict with the Chief Mloli and the Yao chiefs. In 1889 the Brit. S. Africa Company applied for a charter to trade in the country, and in the same year a large expedition was sent out under Maj. A. de Serpa Pinto to explore the Upper Zambesi and Lower Loangwa, and Sir H. H. Johnston arrived at Mozambique as consul with the special duty of composing differences with the Arabs of the interior. Treaties were concluded with the Makololo chiefs and with the Yaos round Blantyre and, following a brief encounter between Serpa Pinto and Maluri, a powerful Makololo chief, the Brit. Gov., on Sept. 21, 1889, proclaimed a Brit. protectorate over the Shire dists.

Johnston, in his journey up the lake, induced the 'Jumbe' or sultan of Kota Kota to put his country under Brit. protection and arranged similar treaties with Mloli and other Arab and Waloona chiefs. This work of Johnston was ratified in 1891 by an Anglo-Portuguese convention and, soon afterwards, a Brit. protectorate over the countries adjoining Nyasa was proclaimed. The protectorate of Nyasaland was confined to the Shire and Lake Nyasa dists., the rest of the ter. under Brit. influence being placed under the Brit. S. Africa Company. In 1891 there were expeditions against slave-raiding Yaos at the S. end of the lake, while the next few years brought much trouble in the way of slave-trading and constant raids; but by placing three gunboats on the lake, the dispatch of Sikhs from India, and the recruitment of native troops, the slave trade was abolished. In 1893 the name of the protectorate was changed to the 'Brit. Central Africa Protectorate,' but the old name N. P. was restored in 1897, by order in council amending the constitution. See H. L. Duff, *Nyasaland under the Foreign Office* (2nd ed.), 1906; W. P. Johnson, *Nyasaland: the Great Water*, 1922; S. S. Murray, *A Handbook of Nyasaland*, 1932; L. S. Norman, *Nyasaland without Prejudice*, 1931; and Lord Hailey, *An African Survey*, 1934.

Nyborg, seaport on the E. coast of Funen Is., Denmark, in the co. of Svendborg, 17 m. E.S.E. of Odense. The fortifications built by Christian IV. were destroyed in 1869. Pop. 9700.

Nyctalopia, defect in the vision of people who can see distinctly in a faint light only, and not in bright daylight. The term is sometimes applied to the opposite defect of vision, by which some people are unable to see distinctly save in light of great intensity; this is 'night-blindness,' and is inherited as a Mendelian dominant character.

Nygaardsvold, Johan (b. 1879), Norwegian statesman, b. at Hønnelyk, Trondelag, son of a cottager. He worked as a saw-mill hand and farm labourer, and later on railroad construction in America for six years. Returning to Norway, he joined the Socialist party, and, in 1915, was elected to the Storting, of which he was president in 1934-35 (and of the Lagting in 1929). He became leader of the Labour party group in 1932 and formed a gov. in 1935, which was in office at the time of the Ger. invasion of 1940, and which directed the heroic flight of Norway against the Gers, until N. had to withdraw, with his ministers, to London; there he continued to hold office as Prime Minister and minister of public works until the liberation of Norway in 1945.

Nyköping, seaport and the cap. of Södermanland, Sweden, at the head of the Byfjord, on the Baltic, 98 m. S.W. of Stockholm. Fifteen national diets were held at N. in the thirteenth to the fifteenth centuries. It has a good harbour, and exports iron and zinc ore, timber, wood-pulp, and oats. There are engineering and textile manufs. Pop. 14,200.

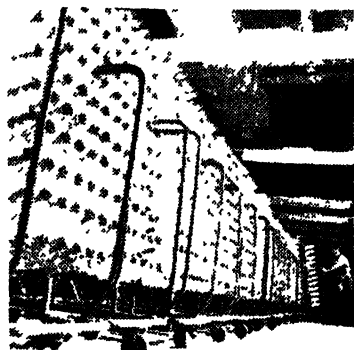
Nylghau, Nilgai, or Blue Ox, large antelope, found in central India. The male is slate or dark grey, darkening with age, the legs are black; the female is fawn or reddish brown. On the throat is a white patch and below it hangs a tuft of dark hair. The male is over 4 ft. at the shoulders, but the back slopes down as the hind legs are shorter than the fore legs. The female is about a third smaller, and lacks horns, which in the male are black, short, and erect. Though in the jungle it is a wary animal, in the more cultivated districts it is very tame. Natives regard it as sacred. Its skin makes valuable leather.

Nylon, newly coined generic name for a whole class of entirely new materials. Already there are sev. 'nylons'; there will be many more. The name itself, which has no etymological significance, was invented by the Amer. firm (E. I. du Pont de Nemours Incorporated) in whose laboratories N. was first made. N. has no exact counterpart in nature, although its chemical composition is akin to proteins. It is a product with its own characteristics and can be made up into various forms: powders, solutions, sheets, strands, and yarns. The following definition of N. has been accepted at I.M. Patent Office: 'Nylon is a generic term for synthetic fibre-forming polyamides, i.e. organic condensation products which contain a multiplicity of structural units linked in series by amide or thioamide groupings, produced by a process of manufacture in which non-fibre-forming organic substances of lower molecular weight are converted into products of such high molecular weight as to be capable of being formed into filaments, which, on cold drawing, form a true fibre structure recognisable by X-ray examination.'

Chemical Basis.—The building up of very long chain-like molecules from short molecules, a process known as 'super-polymerisation,' can be effected in many different ways. A method in general use is to form a particular superpolyamide, '66' polymer, by heating adipic acid and hexamethylene diamine together; water is eliminated during the reaction. The resultant polymer is called '66' because each molecule of these reagents contains six carbon atoms. The raw materials from which the diamine and adipic acid for making '66' polymer are obtained include phenol from coal, oxygen and nitrogen from the air, and hydrogen from water; hence the popular, though over-simplified statement that N. is made from coal, air, and water.

Manufacture.—N. yarn, used for many different textile purposes, is manufactured by an extrusion process. The polymer chips are poured into a hopper and melted; the molten polymer is then pumped downwards through a spinneret, a metal disk containing fine holes. The thin streams of liquid forced through these holes are cooled by air currents and so become solidified into continuous filaments which are wound on to a cylinder. The yarn is next subjected to the process known as 'cold drawing,' mentioned in the Patent Office definition above. By this process

the yarn is drawn out to three or more times its original length. During this stretching operation, the long chain-like molecules which make up the filament become oriented, so that they lie mainly parallel to the fibre axis and close to one another. It is this drawing operation which gives to N. the properties of a textile fibre; before this takes place the filaments are simply extruded polymer. The yarn is now ready for further processing, which varies according to the particular purpose for which it is required.



British Nylon Spinnings Ltd
ROBBINS OF NYLON AWAITING FURTHER
PROCESSING

Properties.—N. yarn has a combination of properties unique among textile fibres. One of the most notable is remarkable tensile strength combined with lightness in weight and a high degree of resilience. The tensile strength of N. yarns can be regulated during manuf., but N. is normally made into yarns considerably stronger than other textile fibres of the same dimensions. Compared with metal wires N. is twice as strong as the same size of aluminium wire. No other textile fibre in general use can equal N.'s elasticity. N. yarns are elastic up to about 8 per cent stretch, regaining their original length quickly. Above 8 per cent stretch a slight but permanent elongation occurs. Besides being strong and resilient, N. shows remarkable resistance to abrasion. This unusual durability has set new standards in the wearing qualities of a wide range of textiles. N. yarns have comparatively low moisture absorption, and therefore dry with unusual rapidity. The wet strength of N. is unusually high, approximately 85 per cent of its strength when dry. N. fabrics are particularly easy to wash and clean; dirt comes away rapidly from the smooth cylindrical fibres. N. yarns resist alkalis and hydrocarbons, soap solutions, oils, and petroleum. They are attacked by strong mineral and certain organic acids.

A special property of N. yarns is that fabrics made from them can be set to any desired permanent shape by heat treatment with boiling water or steam

under pressure. These heat-set fabrics show little or no shrinking or stretching. The melting-point of N. depends on the chemical composition of the particular N. concerned. Melting-point for most N. textile fabrics is approximately 180° F. N. yarn does not blaze when brought into contact with a flame; it fuses, forming a round hard bead. N. itself is not attacked by insects, micro-organisms such as bacteria and fungi, or mildew.

Uses.—N. first became famous as a yarn for women's stockings, but it is now used for over 150 different textile purposes, both domestic and industrial. N.'s particular combination of properties makes this yarn especially suitable for a wide range of uses. There is already a great variety of N. apparel fabrics, woven and knitted; many more are being developed. N. ropes and cords are well established. Other industrial uses include nets, filter cloths, heavy duty canvases, tyre cords, and transport upholstery.

Centres of Manufacture. All the N. yarn made in Britain is produced at Pontypool, Monmouthshire. The main development has been in continuous filament yarns, but N. staple is now also being produced in small quantities; this will extend the range and variety of N. products. N. yarns can be woven, knitted, or braided on the normal textile machinery, so they can be used on existing plants. *See also* PLASTICS.

Nymphs, in Gk. mythology, a class of female divinities of inferior rank, always depicted as beautiful maidens of eternal youth, connected with the forces of nature, and generally with some divinity of higher rank, Artemis, Apollo, Pan, and Hermes. They were divided into the Oceanids, N. of the open sea, and Nereids, N. of the inland seas; Naiads, who presided over rivers, brooks, and lakes; Oreads, N. of the mts. and grottoes, among whom was Echo; and Dryads or Hamadryads, who dwelt in the forests and trees. *See* J. H. Krause, *Die Museen, Grazien, Horen und Nymphen*, 1871, and F. G. Ballentine, *Some Phases of the Cult of the Nymphs*, 1904.

In zoology nymph means the immature form of an insect, e.g. dragonfly, resembling the adult except for its smaller wings, and possessing compound eyes; it must not be confused with a larva (e.g. a caterpillar) which has a form entirely different from the adult, and in which the eyes are simple.

Nymwegen, *see* NIJMEGEN.

Nyon, small tn. of the prov. of Vaud, Switzerland, on the W. shore of Lake Geneva, about 12 m. N. of Geneva. It stands at the junction of the railway to Geneva and Lausanne with the lines running into France. It has porcelain manufs. and a pop. of 8000. N. was the old Rom. colony of *Julia Equestris*. It

was seized by Bern in 1536 and retained under the treaty of Lausanne, 1564, after other tns. had been surrendered under that treaty, Bern engaging to maintain the old rights and liberties of Vaud. Here during the Sp. civil war was held a conference of Mediterranean and, later, Black Sea powers, called at the instance of Great Britain and France to deal with attacks made by submarines. These attacks in the Mediterranean were at first thought to be due to Franco's insurgents, but it soon became evident that they were made under the orders of the It. Fascist Gov. To defer to It. susceptibilities the Brit. Gov. consented to hold the conference not at Geneva, as originally intended, but at N., being a small tn. in the same neighbourhood. The conference opened on Sept. 11, 1937, but without the participation of Germany and Italy, both of which had been invited. In the resulting agreement Great Britain and France undertook between them to patrol the Mediterranean and thereby make that sea tolerably safe for shipping. These two govs. suggested that Italy should undertake the patrol of the Tyrrhenian Sea, but Mussolini rejected the offer and demanded that Italy should be taken into the scheme on a footing of equality with the major powers. The Fr. and Brit. Govs. at first ignored this demand, but, shortly afterwards, a tripartite conference assigned to Italy a zone between the It. and African coasts.

Nyren, John (1764-1837), famous early cricketer and writer on cricket, son of Richard N., also a famous cricketer, was a member of the Hambledon club, founded by his father, of Hampshire. He was a left-handed average batsman and a good fielder at point and mid-wicket. His reminiscences were pub. in *The Young Cricketer's Tutor* (ed. by C. Cowden Clarke, 1833, and by E. V. Lucas, 1907). Andrew Lang refers to him as the 'Herodotus of the early historic period of cricket.'

Nysa, *see* NISSESE.

Nystad, *see* UUSIKAUUNKI.

Nystagmus, eye disorder, consisting of an oscillation of the eyeball accompanied by giddiness and a twitching movement. It is present in disease of the labyrinth or semicircular canals which control the balance of the body. Air pilots are specially tested for N. before being allowed to fly. *See also* under EYE.

Nyx, in Gk. mythology, personification of night, called Nox by the Romans. In the Hesiodic theogony N., with Erebus, is the offspring of Chaos; and N. and Erebus become the parents of Aether and Hemera, i.e. pure air and the day. N. is also held to be the mother of numerous recompense, Nemesis. She is represented as a winged goddess in a chariot and her residence is fabled to be in the darkness of Hades.

O, the fifteenth letter of the Eng. alpha-
bet is the only vowel in the language
which generally (but not always) corre-
sponds in sound with the *o* of Ger., Fr.,
and other European languages. Besides
the name sound is in *ome*, a sound which
is represented by a variety of spellings,
though *o*man for *hardboy* etc. it has
the short sound as in *lot* and a third sound
as in *none* which links it with *u*. Indeed
A, S, as as well as *us* and *os* are often
transcribed in modern Eng. by *o*. The
N. Semitic alphabet which was the proto-
type of the Gk. and thus of all the W.
alphabets had no vowel; it was a purely
consonantal alphabet (*see under* ALEXA-
BER). The Gks. overcame this difficulty
by using the Semitic *ayin* (representing
a Semitic sound (a kind of guttural
breath) which did not exist in Gk.). The
reason for using *ayin* for *o* is not quite
clear at all, but it was the last letter
still available for the purpose. The Gk.
and the Lat. *o* as well as the *o* of all the
European alphabets resemble in shape the
early N. Semitic *ayin* much more than
the *ayin* in modern Semitic alphabet
(Heb. or Arabic). In the primitive Gk.
alphabet the letter was used for *o*, *u*, and
o. Later another symbol was devised for
u, namely *u* called *upsilon* (the Eng. *y*) in
Gk. grammars to distinguish it from *o* or
omicron (the small *o*). Yet *omicron* and
omega were not true pure *o* for *o* con-
tracted to *u* (cf. *u* contracted
form *ου* *u*) and *u* was really a close
whistle *u* was in *open* and *u*.

In chem. **O** is the symbol for oxygen
and **Os** for osmium.

O, Francois, Marquis d' (1733-94)
b in Paris was superintendent of finance
under Henry III. and Henry IV. and
governor of Paris.

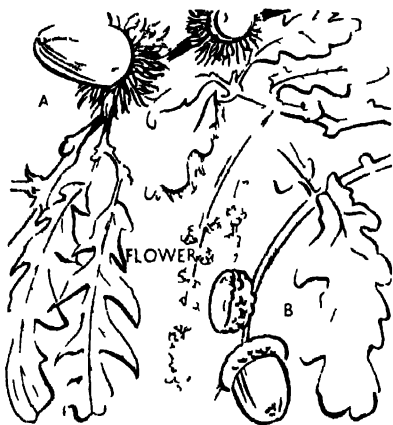
Oahu, see under HAWAIIAN ISLANDS.

Oajaca, see OAXACA.

Oak But **O** with its wide distribution
throughout great parts of Europe and
Asia is the best known and most im-
portant of its genus (*Quercus*). Pedunculata
(*R. b.*) or common Eng. **O** is the
commonest **O** over the greater part of
England, Ireland and the Scottish Low-
lands. Its acorns have long stalks and its
leaves are stalkless or nearly so. *Sessili-
folia* (*pubera* or *Drumma* **O**) bears dark
fruits, short leaf stalks and short stalks
while the undersides of the leaves are
downy. It is harder than *Pedunculata*,
and is better able to withstand drought.
Other varieties occur but they are un-
doubtedly hybrids between *Pedunculata*
and *Sessiliflora*. Among foreign species
may be mentioned *Quercus ilicifolia* the Holm
O (*q*), *Quercus cerris* the Turkey **O**
(*q*), with bristly cups for the acorns,
Quercus suber whose bark yields the cork
(*q*) of commerce.

Pedunculata is predominant in forest on

heavy clayey soils. *Sessiliflora* is typical of
forests on lighter, more sandy soils. The
O once covered large areas of Britain from
Leithshire southwards and has had a
considerable influence on the development
of the country for its timber was vital to
shipbuilding in the formative years of the
country's seaport. The last extensive
planting occurred during the Napoleonic
wars, but this stimulus to afforestation in
Britain has ceased since the middle of last
century. The **O**s are not remarkable for
height. In close company they may attain
100 ft. but in the open they do not exceed
60 ft. 80 ft. But they are very massive
with great earth-tugged bole, gnarled
crooked branches and a great spread of
crown. They take a century certainly
over 1000 years and perhaps more. The
leaf of the **O** is oval with large rounded
lobes and in autumn the tint changes
from bronze to pale brown. The flowers
are borne in small cups on stalks which
later bear acorns each fruit fitted with the
cupule (pericarpium) from 1 to 1 1/2 in.



OAKS

A. English oak B. Turkish oak

bract. **O** timber is not only very hard
and durable but owing to its broad
medullary rays shows most beautiful
silver grain flower or *q* when cut on
the true quarter. To the true cutting of
the timber the beauty of the old **O**
panelling is due but **O** timber on
account of its slow growth does not pay
to cultivate in most parts of Britain
though in combining the good qualities of
other timbers it is unrivalled for certain
purposes. *See also* BARK OAK.

Oak-apple Day (May 20) day of the
restoration of Charles II. to the Eng.

throne in 1660. On this day oak-leaves or oak-apples are sometimes worn in memory of the king, because on Sept. 6, 1651, he took refuge in an oak-tree, when fleeing from his pursuers.

Oakeley, Frederick (1802-80). Eng. tractarian; youngest son of Sir Charles O., one-time governor of Madras. Educated at Christ Church, Oxford, he was chaplain-fellow of Balliol College, Oxford, 1827, and prebendary of Lichfield, 1830. He joined the Tractarian movement, and became incumbent of Margaret Chapel, London, into which he introduced ritualism (1839-15). In 1845 he followed Newman into the Rom. Catholic communion. He was an original canon of Westminster diocese from 1852 to 1880. O. trans. the Lat. hymn *Adeste Fideles* as 'O come all ye faithful' (1841). He pub. theological works before and after his secession.

Oak Fern, see POLYPODIUM.

Oak-galls and Oak-apples. No plant is more subject to the attacks of gall-producing insects than the oak, and the abnormal production of plant tissue takes many forms, which are remarkably consistent in their variety. The beautiful gall-wasp (*Cynips kollari*), for instance, invariably causes the marble galls on young oaks by laying its eggs, which hatch into the fat grubs found inside the galls. Another (*Dryophanta scutellaris*) causes the formation of small cherry-like galls on the under-surface of the leaves, usually along the midrib. A gall produced by *Cynips tinctoria*, found in S. Europe, was formerly used on a large scale in the manuf. of ink, but is now displaced by superior chemical processes.

Oakham, co. tn. of Rutland, England, in the vale of Catmose, 11 m. E.S.E. of Melton Mowbray. There is a school founded in 1584; it now accommodates about 300 boys, its constitution having been reorganised on public-school lines in 1875. The tn. is a centre for hunting. There are manufs. of boots and shoes and knitted garments. Pop. 3600.

Oakingham, see WOKINGHAM.

Oakland, city of California, U.S.A., co. seat of Alameda co., on the E. coast of San Francisco Bay, 6 m. from San Francisco. It is an important seaport, and ship-building, fruit-canning, and tanning are the chief industries. Manufs. include cotton and woollen goods, steel goods, etc. A Congregational seminary and a Rom. Catholic college are at O. Salt is mined, and there are clay pits and stone quarries. Pop. 100,000.

Oak Park, tn. of Illinois, U.S.A., in Cook co., 9 m. N.W. of Chicago, of which it is a suburb. Farming is carried on. Pop. 66,000.

Oak Ridge, settlement in Tennessee, U.S.A., given over to a section of the atomic bomb project, and officially known as the Clinton engineering works. The plant, which covers nearly 60,000 ac., was set up in 1943 for the production of plutonium, considerations governing the choice of site being its distance from the coast and the proximity of Tennessee Valley Authority water and power supplies. Pop. 48,000 (in 1945 78,000).

Oaks, The, see HORSE-RACING; RACE MEETINGS.

Oakum, hempen fibre made from old ropes, the best kind being produced from tarred ships' rope. It is used as a surgical dressing in emergencies, and for stopping leaks and caulking seams in ship construction. The name was once used to denote tow, a part of flax fibre.

Oamaru, chief tn. of Otago Prov., S. Is., New Zealand, situated on the E. coast and on the main N.-S. highway, 78 m. from Dunedin, and 152 m. from Christchurch. In 1853 the land on which the tn. now stands was acquired as a grazing run. It was proclaimed a municipality in 1866 with a pop. of approximately 1000. Most of the streets, which are planted with trees, are named after Eng. or Scottish rivs. Many buildings in the business portion of the tn. are built of O. stone, from the limestone quarries in the dist. The local stone deposits are the source of flourishing lime industries producing both carbonate of lime and burnt lime. There are four flour mills, a woollen mill, a freezing works, and engineering and joinery works in the dist. O. has a good harbour capable of handling overseas shipping. It has plentiful supplies of water, electric power, gas, and soft coal. Besides the primary schools there are four fine residential secondary schools. The surrounding dist. is a prosperous agric. community closely settled and generally well farmed. Pop. 8000.

Oarfish, genus of large spiny-finned teleostean fishes (*Regalecus glesne*), remarkable for its shape and internal organisation, the latter being undoubtedly that of a deep-sea fish. It is said that they are among the largest, if not the largest deep-sea fishes known, most specimens observed measuring 12 ft. in length, while some are recorded to have exceeded 20 ft. Like that of other members of this family the body of the O. is exceptionally elongated and compressed, and sword shaped, but in the O. this feature is emphasised, for the length of the body is some fifteen-fold its depth. The O. has no scales on its body, it has a small mouth and large eye, and a compressed head like that of a herring; its very long and many-rayed dorsal fin, whose foremost rays are enlarged into a crest, extends from behind the head to the imperfect tail, which latter is apparently lost as useless at an earlier period of the life of the fish. The long slender ventrals, by which the O. is distinguished from the other ribbon fishes, become long paddle-tipped filaments. The range of the O. in the great depths of the ocean seems to extend over all seas from the Mediterranean and North Seas to the S. Atlantic, and from the Indian Ocean to the coast of New Zealand. For the past century and a half a number of specimens have been found stranded on Brit. coasts.

Oases (sing. Oasis). Isolated fertile regions within deserts, due to the presence of water. This may be due to springs, pools, or damp hollows in water courses, usually dry, or water-courses from beyond the desert not yet dried up. They are generally arranged along the foot of a

range of hills or mts., or an outcrop of rock. Some are of large area, and form the homes of tribes. Many are being created by means of artesian wells.

Oast-house, building containing kilns for drying hops. The hops are placed on horse-hair covered floors, which are heated from below, and the O. is so constructed as to allow a constant draught of warm air to pass through and out at the top. Circular Os. with conical roofs are a feature of the hop-growing dists. of Kent, England.

Oastler, Richard (1789-1861), Eng. social reformer, b. at Leeds, was apprenticed to an architect, but became famous as the protagonist of the Ten Hours Bill in the campaign for factory reform. In 1830 children were employed in the worsted mills for thirteen hours a day with an interval of half an hour, and in the woollen mills fifteen hours with an interval of two hours. John Wood, the famous worsted spinner of Bradford, who was one of the earliest champions of the children's cause, declared to O., when urging him to embark on the crusade with which his name became so gloriously associated, that the factory children were worse off than the slaves in the W. Indies. The struggle, which was aggravated by the tremendous slump in hand-loom weaving through which parents were reduced to living on the passing of the Ten Hours Bill, which limited the actual work of all between nine and eighteen years of age to ten hours a day, exclusive of meal times. His was one of the chief names associated with this reform, others being John Fielden, Michael Sadler, and Lord Shaftesbury. O. also advocated the abolition of slavery and opposed Catholic emancipation. He continually wrote and spoke for the improvement of factory legislation, and contributed numerous articles to periodicals on the subject. He was imprisoned (1840-1844) for a debt arising out of his objection to the new poor law, but the debt was discharged by subscription. He pub. *Fleet Papers* from prison.

Oates, Lawrence Edward Grace (1880-1912), Brit. explorer, b. at Putney. He was wounded in the S. African war, and joined Capt. Scott's Antarctic expedition (1910), being one of the final party which reached the S. Pole. On March 17 O., who had been taken ill and feared that he would be a hindrance to his companions, deliberately left his tent to die. Scott in his diary commented: 'It was the act of a very gallant gentleman.' See E. R. G. R. Evans, *South with Scott*, 1921, and L. C. Bernacchi, *A Very Gallant Gentleman*, 1933.

Oates, Titus (1659-1705), Eng. conspirator, b. at Oakham. Son of an Anabaptist preacher, who had taken Anglican orders at the Restoration. O. was expelled from Merchant Taylors' school after a year and was sent down twice from Cambridge, first from Ouis and then from St. John's—of which college he afterwards claimed to have been bursar. Having taken holy orders, he held sev. curacies and a naval chaplaincy, from which he was invariably dismissed for vicious conduct.

The same thing happened also when he entered the Rom. Church. It was at this juncture, in 1678, that he conceived his story of a popish plot to murder the king, burn London, and slaughter the Protestants. It is said that the original inventor of the popish plot was Israel Tonge, holder of three benefices of the Church of England, who himself probably half believed in it; and that O. was first his tool and later sole actor in the melodrama. He perjured himself by making an affidavit before Godfrey, the magistrate, and in spite of the palpable inconsistencies in his evidence succeeded in creating a panic, which led to the execution of many innocent Rom. Catholics, and in securing for himself a pension of £600 and a suite of rooms in Whitehall. The duke of York and the queen were victims of his slanders. In 1685 he was found guilty of perjury and condemned to life-long imprisonment with floggings. He regained his liberty and pension on the accession of William and Mary in 1688. See J. Lingard, *History of England*, 1833-1835; P. W. Sergeant, *Times and Fakers*, 1926; and Jane Lane, *Titus Oates*, 1919.

Oath. An O. may be defined as a solemn declaration to a superior or divine being, or in the name of something held sacred, by which the declarant either undertakes to speak the truth or promises to do something in the future, on pain of calling down on his head divine or preternatural wrath. Os. of the former or assertory kind may be exemplified by the affidavit and the O. of a witness in a court of law, the latter or promissory kind by the O. of allegiance, by taking which a naturalised foreigner becomes a Brit. subject. By the Eng. law of evidence (*q.v.*) all oral testimony in any proceeding must be given upon O., except (1) under the Criminal Law Amendment Act, 1885, in the case of a child of tender years, where, in the opinion of the court, the witness does not understand the nature of an O., and generally, in prosecutions under the various Acts for the prevention of cruelty to children, unsworn evidence of children may be accepted; (2) under the Oaths Act, 1888, every person who objects to being sworn on the ground either that he has no religious belief or that the taking of an O. is contrary to his religious belief, may make a solemn affirmation in the prescribed form. The passing of the Oaths Act, 1888, was the result of the agitation of the celebrated Bradlaugh (*q.v.*), member for Northampton. The Act of 1888 effected the removal of the last of the tests for members of Parliament, the others being the O. of supremacy, the O. of abjuration, the O. of allegiance, and the declaration against transubstantiation. There were prior to 1888 other Acts making provision for the taking of Os. by Quakers, Rom. Catholics, and Jews, but the Act of 1888 abolished the necessity for any religious beliefs in taking an O., whether by a member of Parliament or any one else. At the present day the law courts still 'swear by Almighty God,' and kiss, or, since the Oaths Act, 1909, simply hold, a copy of

the N. T. Jews swear on a copy of the Pentateuch, and keep their heads covered; Scots witnesses affirm with the hand, up-lifted, while Chinese witnesses require a saucer to be broken before their consciences will permit them to give evidence.

Oats as a food are the richest of the cereals, containing the highest proportions of protein and fat. They are rich in vitamin B1 and carbohydrates, and are valuable for all classes of stock, while their value for human food has gained increased recognition. Boiled with water in the Scots fashion, oatmeal porridge is a substantial nutritious, and appetising dish. The origin of the cultivated species is unknown, none of them occurring in a truly wild state. The wild oat (*Avena fatua*) is supposed to be the original species. Two main races are recognised, viz. common O. (*Avena sativa*), with open spreading panicles, and Tartarian O. (*A. orientalis*), with contracted one-sided panicles. The white and black varieties of the latter are more productive in warm climates, and are favoured for their tall stiff straw. The varieties of the common O. differ chiefly in the colour and thickness of the husk, the shape of the grain, the period of ripening, the length of the straw, and the tendency to shed the grain when ripe. Other species are weeds. The bristled-pointed O. (*A. strigosa*) and the short O. (*A. brevis*) are sometimes, like the common O., grown as green fodder.

Oaxaca, state of Mexico, at the S. end of the isthmus of Tehuantepec. It is mountainous, broken in the interior, and tropical on the coast. The state is well watered, and mining and agriculture are the chief pursuits. Indian corn, coffee, sugar, cacao, wheat, fruits, tobacco, rubber, and indigo are produced. Area 36,370 sq. m. The cap. is O. de Juarez, an old stately city built by the Spaniards on the site of the Indian cap. It is situated in the central part of the state, on the Rio Verde, at the foot of the jagged peaks of the Sierras, that stand between it and the sea, at an elevation of 5000 ft. It is 288 m. S.S.E. of Mexico City, with which it is connected by a narrow-gauge railway. In 1943 a new 200-m. highway connecting O. with Matamoros (Puebla) was formally opened. The modern city remains even more Sp. and Indian than Guadaluajara, with the descendants of Zapotec and Mixtec Indians in traditional costume and sandals in its modern streets, its early churches, and old houses. The church of Santo Domingo, with an interior which is regarded as the most superb example of Baroque decoration in Mexico, was founded by the Dominicans in the sixteenth century. Its ceilings and interior are covered with gold and polychrome reliefs of remarkable richness. La Soledad (temple to the Virgin, Our Lady of Solitude, O's patron saint), is another massive sixteenth-century building. The markets of O. are noted for pottery, blankets, and fruit and vegetables. Some 4 m. from the city are the ruins of Monte Alban, which was evidently once the cathedral of a whole Zapotec diocese, "a cathedral without a cathedral town" for

the Indians who lived in the valley. These famous ruins comprise andl. terraces, mounds, courts, tombs, and giant staircases, in process of being restored by archaeologists. The Mitla ruins in a vil. of the same name (the ancl. cap. of the Zapotec Indians) lie 26 m. from O. The Spaniards took the valley of O. in the sixteenth century, and O., a vassal of the Sp. crown, was given to Cortés, mar- quess of the valley of O., as a grant. As a sp. city O. prospered from the vast agric. areas of the valley, and the precious metals of the mines. O.'s part in the political vicissitudes of Mexico is indicated by the fact that from its foundation in 1486 to 1876 it was besieged and taken seven- teen times. Pop. (state) 1,193,000; (city) 29,300.

Ob, or **Obi** (Ostiak **As** or **Yag**, and Tatar **Omar**), riv. of W. Siberia, some 2200 m. long, and with a drainage area of over 1,100,000 sq. m. It rises in the Tomsk Region, at the confluence of the Buja and the Katun, which both rise in the Altai Mts. Its main trib., the Irtysh, rising in the W. slopes of the Mongolian Altai, flows swiftly in its course through the mts. In the main the O. follows a N. or N.W. direction, and finally, after receiving the Irtysh from the left and the Tobol, Tayda, and Turan from the right, reaches the gulf of O., a deep inlet of the Arctic Ocean. Between Semipalatinsk and Omsk the O. crosses steppe plains and, in this part of its course, receives no affluents. In the lower half of its course it divides into a number of constantly shifting channels, and here there are great areas of permanent and impassable thickets and marshlands on each side, while the actual banks of the riv. are littered with masses of gravel, stone, and rotting wood. Sand- banks which form in these channels in the summer impede navigation, and owing to the flatness of the land the current is slow and consequently in the autumn the water freezes quickly. In summer the tundra on each side of the mouth of the riv. offers a varied landscape, with flowers, turf, and moss, but great clouds of mosquitoes render existence difficult for man and beast. Around the gulf of the O. there are some small settlements, with a few hundred inhab. At Saltykard are the buildings of a large fish combine, an out- post of industry in an otherwise lonely region around the mouth of the riv. There has been an increase in the fur trade in the region of the lower O., but the difficulties of navigation, and the marshy nature of the land on both sides coupled with the lack of minerals, are incompatible with any great economic expansion in this region, and it is the Vessel rather than the O. which is being developed as the practicable highway into the centre of Siberia. At Barnaul the O. is a quarter of a mile wide; between Novosibirsk and Narin the width increases to half a mile, and at its confluence with the Irtysh it is 3 m. wide and very deep. The estuary is deep, and widens into a gulf about 30 m. wide. The head of navigation is at Kuz- netnsk, which can be reached by large riv. vessels in May-June. The riv. is free for

only 200 days at Kolyvan and 150 days at Obdorsk.

Obadiah ('servant' or 'worshipper' of Jehovah), one of the twelve minor prophets. Nothing is known of his hist., and the book of O., though the shortest of the prophetic writings, is at the same time one of the most difficult and most interesting. Its twenty-one verses are directed against Edom because of her behaviour to Judah in the day of the latter's calamity, when Jerusalem was captured and lots cast over it. The book shows parallels with parts of Jeremiah too close to be due to coincidence. It seems likely that both were indebted to an earlier prophet whose work has perished. See G. W. Wade, *Micah, Obadiah, Joel and Jonah*, 1925, and G. A. Smith, *The Book of the Twelve Prophets*, 1928.

Oban, seaport of Argyllshire, Scotland, 30 m. N.W. of Inveraray. The little is. of Kerrera shelters the excellent harbour from the Atlantic gales, and also accounts for its almost land-locked situation. The picturesque situation at the foot of the hills and the proximity of the ruins of Dunolly and Dunstaffnage castles, Glencoe, and the is. of Staffa and Iona, have made the town a life centre for tourists to the W. The prin. manufs. are whisky and tweed; there is fishing. Pop. 6500.

Obligato, instrumental accompaniment in a musical composition, performing an important soloistic function. In Bach's Mass in B minor the bass aria *Quoniam* has a harp O.

Obeah, system of sorcery once prevalent among the Negro pop. of the W. Indian colonies, especially in Jamaica, and also in the S. U.S.A. It appears to have been introduced from Africa by Negroes who had been enslaved, and to these O.-men (or women) the blacks used to resort for the cure of disorders, obtaining revenge, conciliating favour, the discovery of a thief or adulterer, and the prediction of future events. The practice of Obi had become general towards the close of the eighteenth century, both in the W. Indies, and in the U.S.A., and there is evidence that the O. man exercised vast influence, and that he carried on a system of slow poisonings, the effects of which were attributed by his more ignorant fellows to the workings of the spells of O., and never to the more obvious effects of the scores of poisonous herbs growing in every pasture, and which may have formed the ingredients of the O. mixture. The system, which resembled other superstitions of savage peoples, may have originated in ant. religious practices in which sorcery bore a large part. To-day the force of O. has degenerated into a common form of witchcraft, not infrequently associated with devil worship (J. J. Williams). In any case, the O. man has a wholesome fear of the priest, and usually tries to avoid his presence. See E. Long, *History of Jamaica*, vol. II, 1774; *Report of the Jamaica Royal Commission*, 1886; H. J. Bell, *Obeah: Witchcraft in the West Indies*, 1889; R. T. Banbury, *Jamaica Superstitions or the Obeah Book*, 1895; H. H. Nassau, *Pelishian in West Africa*, 1901; R. S.

Rattray, *Ashanti*, 1923, and *Religion and Art in Ashanti*, 1927; E. M. Cook, *Jamaica: the Limestone of the Caribbean*, 1924; and, especially, J. J. Williams, *Foodoos and Obeahs: Phases of West India Witchcraft*, 1933.

Oboid, El (Africa), see EL OBEID.

Obelisk (Gk. *obeliskos*, diminutive of *obelos*, a spit), four-sided monumental pillar with a pyramidal top. Corresponding to the Gk. *stela* and Rom. columns, they were placed in pairs by Egyptians at the entrance of temples or before gateways. Those that remain are of great antiquity. The Romans carried off sev. from Egypt, two of which, originally erected by Thothmes III. at Heliopolis, were taken by Augustus to Alexandria. These are popularly known as Cleopatra's Needles, one being brought to London in 1877 and the other to New York in 1879. The O. in Paris, one of a pair of Rameses II., which stood at Luxor, was presented by Mehmet Ali (1837). The Egyptians dedicated Os. to sun deities, and worshipped them. See J. C. Zœga, *De Origine et Usu Obeliscorum*, 1797; H. H. Goeringe, *Egyptian Obelisks*, 1882; Parker, *The Twelve Egyptian Obelisks at Rome*, 1879; and A. Erman, *Römische Obeliske*, 1917.

Oberalp Pass, mt. pass in Switzerland over the Alps, on the borders of the cantons of Uri and Glarons. It attains a height of about 6730 ft., and it connects Andermatt, above Goeschenen, with the valley of the Vorder Rhine to Disentis. It forms with the Furka the chief route for tourists from the Simplon and Zermatt to the Engadine.

Oberammergau, vil. on the r. b. of the Ammer in upper Bavaria, situated 41 m. S.W. of Munich. The pop. is engaged mostly in wood and stone carving. At this vil., in an open-air theatre seating over 5000 people, a famous Passion Play is performed every ten years in fulfilment of a vow which was made in 1634 when the vil. was visited by a severe plague. This play draws visitors from all parts. Pop. 2300. See MIRACLE PLAYS; PASSION PLAYS.

Oberbaden, Switzerland, see BADEN.

Oberelchingen, see ELCHINGEN.

Oberhausen 1. Tn. of Rhineland, Germany, on the Kinseker 7 m. N.W. of Essen. It has important coal mines and iron works, and is noted for zinc smelting works, rolling mills, and manufs. of chemicals, glass, and porcelain. Pop. 191,300. 2. Mkt. tn. of Bavaria, in Swabia, on the Wertach. It is a N. suburb of Augsburg. It manufs. hosiery.

Oberlin, Jean Frederic (1740-1826), Alsatian pastor and philanthropist, b. at Strassburg, son of a teacher. He studied theology, and became Protestant pastor of Waldbach in the Steinhel valley (Ban de la Roche), a backward, wd., mountainous dist., which had been devastated in the Thirty Years war. In its poverty it offered oppo. for O.'s philanthropy, and he became known for his remarkable efforts to improve the lot of the people both spiritually and materially. He constructed roads and bridges, introduced an improved agric. system, built substantial cottages for the peasantry

founded an itinerant library, and estab. a number of vil. schools; he was in fact the founder of the first infant schools. He was closely associated with the Brit. and Foreign Bible Society in its efforts to supply the dearth of the Scriptures in a number of continental countries. *See* lives by Spach, 1866; E. Bodemann, 1868.

Oberlin, tn. of Ohio, U.S.A., in Lorain co., 30 m. S.W. by W. of Cleveland. Its college was founded in 1833. Pop. 4300.

Obermaier, Hugo (1877-1946), Ger. archaeologist, b. at Regensburg. He entered the Church in 1900, and in 1911 became prof. at the Institut de Paléontologie Humaine in Paris. In 1914 he became prof. at Madrid, and conducted prehistoric research in Spain and elsewhere on the older Stone Age and paleolithic art. From 1938 to 1946 he was prof. at Freiburg, Switzerland. His publs. include *Der Mensch der Vorzeit* (1912); *l'Homme fossile* (1920, 1944; Eng. trans. 1921); *Buschmannskunstliche Felsmalereien aus Südruestafrika* (with H. Kuhn, 1930); and *The Cave of Altamira et Santillana del Mar, Spain* (with H. Breuil, 1935).

Oberon (Fr. *Alberon* or *Auberon*, and Ger. *Alberich*, rich elf), king of the elves. In England he is best known for the delightful part he plays with Titania, his wife, in Shakespeare's *A Midsummer Night's Dream*. There is really no resemblance between this haughty little fairy and the ugly dwarf, Alberich, who steals the Rhine treasure in Wagner's *Ring*. O. is first called the 'roi du royaume de la féerie' in the thirteenth-century metrical romance, *Huon de Bordeaux*. His name is the title of a masque of Ben Jonson (1616), an epic of Wieland (1760), and an opera of Weber (1826).

Oberon, outermost of the five satellites of Uranus, discovered by Herschel in 1787. It revolves in an orbit almost perpendicular to the plane of the orbit of Uranus, at a mean distance of 361,000 m. from the planet, the period being approximately 13 days 11 hr.

Obesity, abnormal excess of fat, almost amounting to a disease, accumulating principally in the thighs, abdomen, and neck. The accumulation of fat depends to a large degree on the health, but in a diseased state of the system the production and deposition of fat are increased. In some cases O. bears no proportion to the food taken, though it is often the result of food being excessive in quantities of certain constituents relative to the oxidising powers of the consumer. It may occur at any period of life, but more commonly prevails after the fortieth year. The predisposing causes are sedentary occupations, inactivity, too rich diet, etc. It is frequent in certain diseases such as anaemia, and in some forms of insanity. It may also be caused by disturbances of the endocrine organs, such as pituitary glands. Many systems have been recommended for the amelioration of this complaint, but treatment should be suited to individual cases. The main point to be considered is the careful supervision of diet and exercise, and the steady aim should be the gradual loss of a few ounces

during the week. All rapid reduction of fat should be avoided, as it is injurious to the system in other ways. The fasting system for the reduction of undue corpulence is perhaps the best known, and the most followed, consisting largely of the avoidance in diet of fat, sugar, and starches.

Obidos, tn. of Brazil, in the state of Pará, 690 m. up-riv. from the port of Pará. The tn. is situated on the N. shore of the Amazon and is the centre of a cacao coffee, tobacco, and sugar-growing area. Pop. 20,000.

Obi Group, *see* under MOLT CECAS.

Obi River, *see* Ob.

Obiter Dictum (Lat. 'said by the way'), expression used specially to denote those judicial utterances and decisions in the course of delivering a judgment which, taken by themselves, were not strictly necessary for the decision of the particular issues raised. In the language of jurisprudence an O. D. is of 'persuasive' and not 'authoritative' efficacy, when cited by counsel in support of an argument. Maine (*Ancient Law*) states that the anc. Rom. juriconsults, in the days when they were called upon to give *responsiones* or legal decisions on cases submitted to them, were in no way bound by the special facts of the case, but could multiply the data at pleasure, and so evolve a general rule from facts, both real and hypothetical. In other words, the formulation of legal principles of wide application was of greater importance than the mere settlement of the client's difficulties. But in the Eng. courts of to-day one of the most effective reasons that can be urged by counsel to prevail upon the bench to ignore a proposition contained in the law reports, is to show that it was not necessary or relevant to the decision of the matter in hand.

Object, *see* under SUBJECT AND SUBJECTIVE.

Oblates, in the Rom. Catholic Church, congregations of men and women, not professed monks or nuns, dedicated to the service of religion. The best-known congregation is that founded by Charles Borromeo, archbishop of Milan, in 1578, and now known as the O. of St. Charles. They form a community of priests who put themselves in the hands of the bishop to be used where and how he wishes. The title O. is also given to lay persons who follow a rule of life under the direction of a religious order, although living outside the monastery or convent.

Obligation, term used in jurisprudence (*q.v.*) to denote the binding force of a legal contract (*q.v.*). With the Rom. lawyers an O. could have its source in delict (tort or actionable wrong), as well as in contract. The Rom. maxim, 'A nude pact, given rise to no obligation, but might be the basis of an exception,' meant that there were some agreements not falling under the recognised heads of contract, which were not enforceable, but were available as defences. Some nude pacts were however, actionable, *e.g.* the *pactum constitutum pecuniarum*, or agreement to pay what one already owed. 'Natural O's.'

were those which, devoid of a recognised legal force, had at least some moral claim to recognition, e.g. an agreement between a paterfamilias and any one in his power, like a son or slave.

Obligation, Days of, in the Rom. Catholic Church, days on which abstinence from servile labour and attendance at mass are commanded. They are (for England and Wales) the Circumcision, Epiphany, Ascension, Corpus Christi, SS. Peter and Paul, Assumption, All Saints, and Christmas Day. For Scotland, St. Joseph and the Immaculate Conception must be added, and for Ireland the feast of St. Patrick.

Oblivion, see LETHUS.

Obock, or Obok, Fr. colony of E. Africa, on the gulf of Aden, now called Fr. Somaliland (q.v.). The port of O. was acquired for France in 1862, but it was not till 1884 that it was actively occupied. It has been superseded by Djibuti.

Oboe, or Hautboy (Fr. *hautbois*), treble reed-woodwind instrument, provided with a double reed mouth-piece and a conical bore. It is made of ebony, silver, or box-wood, and has fifteen keys, exclusive of two octave keys which assist the production of the higher notes. The normal compass is from B₂ below the staff to F₄ above, and includes all the semitones; the music is written in the G-clef. The O. is popular in orchestras because of its exceptional technical efficiency and because of its rich, if somewhat penetrating, and varied tones. It descended from the cromorne, and was in full use by the sixteenth century, though it remained primitive until the eighteenth, and was not fully perfected until the nineteenth. Two O.s., together with two horns, were the most constant instruments in the orchestra, apart from the strings, in the eighteenth century. Bach was fond of the 'hautbois d'amour,' now almost obsolete. There is an eight ft. reed organ stop sometimes



OBOE

called the hautboy, and reproducing the tone of the O.

Obolus, or Obol (Gk. ὀβολός), smallest Gk. coin, and also the smallest Gk. weight in common use. As a coin it was always equivalent to one-sixth part of a drachm, and was therefore worth about 1/625d., though the amount varied. As a weight it was again equal to one-sixth of a drachm, that is, to about 16 grains, although it fell to as low as 8.6 grains during the later Rom. empire.

Obrecht, or Obrecht, Jacob (or

Jacobus Obertus) (c. 1450-1505), Dutch composer, was *b.* at Bergen-op-Zoom. He studied at Leuven Univ. and in 1479 became choir-master at Bergen-op-Zoom. Director of the singing-school at Cambrai, 1481-85, he was teacher at Bruges, 1491-1496, though he must have resided at Antwerp, where he was appointed chapel-master at the cathedral in 1491. Towards the end of his life he went to Italy, and was for a time at the court of Lorenzo de' Medici at Florence. His works include masses, motets, (2) a *Passion*, *chansons*, etc.

Obregón, Alvaro (1880-1928), president of Mexico; *b.* in Sonora of mixed Basque and Yaqui stock, worked as carpenter and farmer. After Madero was shot, O. joined Carranza against Huerta, 1913, defeated that president, and became minister of war; he defeated Villa in 1915. After Carranza's murder O. was president four years from Nov. 1 1920, and was succeeded by his nominee Calles, 1921-28. Calles procured O.'s re-election, July 1, 1924; but O. was assassinated sixteen days later.

Obrenović, Serbian dynasty founded by Miloš O., which held power in Serbia from 1815 to 1903, except the years 1842 to 1848. See V. Georgievich, *Das Ende der Obrenovićs*, 1903.

O'Brien, Kate (b. 1858), Irish novelist and playwright, *b.* at Limerick and educated at Univ. College, Dublin. Her first novel, *I don't say Clock* (1931) won the Hawthornden and the James Tait Black memorial prizes. Her other novels include *The Ante-room* (1934) and *The Last of Summer*, shrewd pictures of Irish temperament with a background in co. Clare; *The Land of Spices* (1941), an unusual novel and imaginative but somewhat marred by obscurity in the use of words; *Mary Lavelle* (1936); *Pray for the Wandering* (1938); and *That Lady* (1946), a distinguished novel based on the hypothetical relations of Anna de Mendoza, princess of Eboli, and Antonio Perez, secretary to Philip II. of Spain. Plays: *The Bridal* (1927), *The Schoolroom Window* (1937); and *Distinguished Villa* (1926). Also the travel book, *Farewell Spain* (1937).

O'Brien, William (1852-1928), Irish journalist and patriot, leader of the 'All for Ireland' party, *b.* at Mallow, co. Cork. He estab. *United Ireland* in 1880, and ed. it with a view to popularising the aims of Parnell and the Land League. He represented S. Tyrone, 1885-86; N.E. Cork, 1887-92; Cork City and N.E. Cork, 1892. O.B. suffered continual imprisonments under the Crimes Act, in connection with the National League and Tenants' Defence League, 1887-91. At first an eager supporter of Parnell, he later veered round to the opposite side; but after he had sat on the Land Commission of 1903 he threw the whole weight of his influence into the scale of the conciliation policy, which looked towards the union of Irishmen of all creeds and classes. He represented Cork City again, 1910-18. At the election of 1918, he and his friends stood aside in favour of Sinn Féin. Among his later

books were *Evening Memories* (1920), and *The Irish Revolution and How it Came About* (1923).

O'Brien, William Smith (1803-64), Irish patriot, *b.* at Promoland, co. Clare, sat in the Imperial Parliament, and though a Protestant favoured Catholic emancipation. He joined O'Connell's Repeal Association, but in 1846 became leader of the 'Young Ireland' party, which had no scruples about the use of physical force. The result was that in 1848 he was sentenced to death for his leadership of an abortive rising. The sentence, however, was commuted, and in 1854 O.B. regained his liberty.

O'Bradaigh (Broder), David (*fl.* 1650-94), Irish poet, *b.* in Limerick, a Jacobite and violent enemy of protestantism and everything Eng. He was well versed in Irish hist. and literature, and the literary merit of his work is high. The bard of the Williamite wars, nearly all of his twenty extant poems, which are written correctly in the difficult Irish metre (*Dan díreach*), reflect contemporary events. One of them, for example, is a twenty-six-stanza political poem on Ireland's ills from 1641 to 1684; another was in praise of James II. and dispraise of William of Orange, being dated 1688; another was on the exile of the native gentry after the siege of Limerick; and another, perhaps the most popular of all, was one whose first line trans. means 'O trooper, if thy desire be to rouse out from home.' Some of the poems were printed and trans. in the *Catalogue of Irish Manuscripts*, by Standish Hayes O'Grady (Brit. Museum). His work was pub. in 3 vols. by MacElean, in 1910-17.

Obscene Prints and Publications, see INDECENCY.

Obscurantists (Lat. *obscurare*), term applied at the time of the revival of learning to those who were 'opposed to all new views, irrespective of their origin, by reason of religious prejudice. The word 'obscurantism' is derived from the pub. in Germany in 1516-17 of *Epistolae obscurorum virorum* (q.v.) against some monks of Cologne. It is generally applied to opponents of progressive ideas. See also HUTTEN, ULRICH VON.

Observantists, see FRANCISCANS.

Observation, mental act whereby the intellect becomes aware of sense data, existents, and universals. Awareness may be defined as a direct cognitive relation with an object. Sensory O. is limited to the direct acquaintance with sense data. When we see a colour or hear a sound our direct cognitive relation is with that colour or sound as such. It is only by a further mental act that we become aware of the objects which causes the sense data of colour and sound. This act is known as perception. Perceptive O., of which sense data are a *sine qua non*, is that form of awareness which we have of particular existent objects. Thus when we see the moon sensory O. makes us aware of light over a defined surface; it is by perception that we have a direct cognitive relation with the luminous object which by convention we call the moon.

Further, in the act of introspection we are often aware not only of certain objects, but also of those objects in various cognitive and conative relations with ourselves. We may perceive not only the moon, but also ourselves as perceiving agents; we may desire the satisfaction of some appetite and at the same time perceive ourselves as desiring. Awareness, however, is not limited to sense data and existent particulars. It extends also to universals, and to universal relations. We are aware not only of red objects, but also of redness; not only of an object preceding another, but also of before and after. Nevertheless, awareness of these universals does not of itself prove the existence of an object partaking of such universals. See also KNOWLEDGE.

Observation, Errors of, see ERRORS.

Observatory, institution for the scientific observation, by means of highly specialised instruments, of natural phenomena, the conditions of which cannot be controlled by the scientist. Os. are classed as astronomical, magnetic, meteorological, tidal, and seismic and volcanic. Astronomical Os. date from very early times if we include obelisks, pyramids, temples, and stone circles, all of which had undoubtedly astronomical uses. The Chinese Emperor Huang-Ti (2698-2598 B.C.) is said to have been responsible for the erection of a great O., but as it is now generally accepted that Chinese characters prior to about 800 B.C. are legendary, this statement should not be taken seriously. The O. at Alexandria, founded in the third century B.C., and associated with the names of Hipparchus, who carried out his observations between 161 and 126 B.C., and Ptolemy, who lived at Alexandria about the middle of the second century A.D., is usually considered the first, and continued until nearly the end of the second century. During the Middle Ages a number of Os. were founded in Muslim lands, amongst which may be noticed those at Damascus, Bagdad, Morágha, and Samarkand. The first European O. was that erected at Nuremberg in 1427 by Bernhard Walther, a wealthy citizen, who had the co-operation of John Müller, known as Regiomontanus, a very capable astronomer. In 1561 Kassel O. was founded by William IV., landgrave of Hesse, and later Hyen in the Sound, where the Dane, Tycho Brahe, inaugurated observational methods (1576-97) which proved invaluable to astronomers of later years. The first post-Galilean O. was that connected with the Univ. of Leyden (1632), and the needs of the art of navigation gave rise to the Paris O., completed in 1671, and to the Greenwich O., completed five years later; during this century Helvelius worked at his own private O. at Danzig, measuring stellar altitudes and making careful drawings of the moon. The Greenwich O. commenced magnetic and meteorological work in 1838 and special solar photography in 1873. It is a Royal O. presided over by an astronomer royal, as also is the O. of Blackford Hill, Edinburgh, founded in 1818 at Culton Hill and moved to its present site in 1896.

Herstmonceux Castle, Sussex, was chosen in 1946 as the home of the Royal O., Greenwich. Owing to the growth of London, astronomical observations at Greenwich were restricted by the impurity of the atmosphere and the glare of the sky at night; for this reason the removal of the O. from the London area became necessary for satisfactory observations. Some of the instruments are now at Herstmonceux, and it is expected that normal work will be in progress there in 1953.

Other institutions in Great Britain include Univ. O., Durham; Univ. O., Oxford (1875); Univ. O. and Solar Physics O., Cambridge, the former founded in 1820 and the latter removed from S. Kensington in 1913, both now under one director; Univ. of London O., Mill Hill; Imperial College O., S. Kensington; Norman Lockyer O., Sidmouth; Univ. O., Glasgow (1840); St. Andrew's O.; Liverpool O.; besides many private Os. In N. Ireland there is the Armagh O. (1791), and in Eire Dunsink O. (1785), now part of the Dublin Institute for Advanced Studies, and supported by the gov. of the republic. In the Brit. Commonwealth of Nations the following Os. may be noticed, but a full list is not given: Royal O., Cape of Good Hope; Radcliffe O., Pretoria; Union O., Johannesburg, and the Yale O. branch station; Bloemfontein O., branch of Harvard College O., and also the Lamont-Hussey O., a branch of the O. of the Univ. of Michigan. In Australia, New Zealand, and Canada there are Os. at Canberra, Sydney, Perth, Wellington (two), Ottawa, Victoria, Toronto (two), and Quebec.

A number of European Os. were damaged during the Second World War and work was temporarily suspended in others, but reconstruction has been in progress for some time. The list which follows is not complete, as this would involve too much space. In France there are Os. at Paris, Meudon, Marseilles, Nice, and Pic du Midi (a branch of Toulouse Univ. O.). In Germany at Bonn, Götting, Göttingen, Leipzig, Munich, Potsdam, Bergerdorf, Heidelberg, and Berlin; in Italy at Rome and also in the Vatican city, Milan, Naples, Pola, and in Sicily at Catania and Palermo; in Spain at Madrid and Barcelona; in Portugal at Lisbon; in Switzerland at Geneva and Zurich; in Hungary at Budapest and Kolosvá; in Czechoslovakia at Prague; in Austria at Vienna and Kremsmünster; in Holland at Leyden; in Belgium at Brussels; in Denmark at Copenhagen; in Norway at Oslo; in Sweden at Lund, in Poland at Cracow and Warsaw; in Latvia at Riga; in Estonia at Tartu (formerly Dorpat); in Finland at Helsingfors; in Russia at Leningrad, Pulkovo, Odessa, Moscow, Lwow, and Nikolaev; in Greece at Athens; and in Turkey at Istanbul.

America has a very large number of Os. and only a few can be noticed, amongst which are Yerkes O. at Williams Bay; Mt. Wilson Os. (two: 350 ft. and 5715 ft.); Lick O. at Mt. Hamilton (4210 ft.); Flagstaff O. (the famous Lowell O.) in Arizona;

Harvard Univ. O.; Leander McCormick O., Virginia; Naval O. at Washington; Delaware O., Ohio; Ann Arbor O., Michigan; Berkeley O., California. The 200-in. telescope is now working at Mt. Palomar, California, and great results are expected from it. In Mexico there is the National O. at Tacubaya and in S. America there are Os. at Caracas, Córdoba, La Plata, Quito, Rio de Janeiro, Santiago, and Montevideo. In other parts of the world there are a few more Os., amongst which may be noticed those at Helwan, Tashkent, Hyderabad, Madras, Kodaikanal, Bombay, Kunning, Tsingto, Hong Kong, Kami-Tamakami, Kyoto, and Tokyo.

The modern tendency in astronomy has been specialisation but combined international work, especially on star cataloguing, is carried on. The Royal O., Edinburgh, does a considerable amount of work on spectrophotometry; Oxford Univ. O. specialises on solar work; Liverpool O. and Tidal Institute is concerned solely with tides; Imperial College O., S. Kensington, is used mainly for teaching students and carries out laboratory investigation of molecular spectra; Heidelberg, Potsdam, and many other Os. concentrate on astrophysics. The Dominion O., Ottawa, has recently devoted a lot of time to meteor investigation with the use of radar; the Lowell O. was specially built for planetary work, in particular on Mars.

Many large Os. have been estab. in comparatively recent times, and special developments have taken place in equatorial mountings. The tower telescope is a feature in these; this telescope does not move, but the light from the sun is fed into it by a coelostat. This is a mirror mounted in such a way that it turns on an axis parallel to the earth's axis, and at such a rate that it just counteracts the earth's rotation. The light is reflected on another fixed mirror, which then sends it downward to an object glass which forms an image in the laboratory at the base of the tower. Under the laboratory is a well into which the sunlight, directed upon a grating, is returned to the laboratory dispersed into spectra, where it can be examined. One tower at Mt. Wilson O. is 150 ft. high and a smaller one is 60 ft. high. The Astrophysical O. at Aretri (Florence) has a tower 80 ft. high and the Einstein tower of the Astrophysical O., Potsdam, is 50 ft. high. This tower was erected in 1921 and was named after the famous scientist. *See also TELESCOPE.*

Magnetic Observatories. The chief Brit. magnetic O. was the magnetic dept. of the Royal O., Greenwich, but this has been moved to Abinger. Two other magnetic Os. (under the control of the Air Ministry) have been estab. at Lerwick, Shetland Is., and Enderbun, Dumfries. There is an Admiralty Compass O. at Slough but the work there is mainly connected with the gyro-compass, not with the magnetic compass. The naval Os. in various countries devote particular attention to magnetic work, and important investigations on the subject have been made by polar explorers who have determined the

magnetic N. and S. poles, but not always with great accuracy in the case of the N. magnetic pole. Aerial observations in recent times have given the position of the N. magnetic pole with much greater accuracy than that found by previous investigators.

Meteorological Os., are referred to in the article METEOROLOGY and seismological Os. in the article SEISMOGRAPH AND SEISMOLOGY.

The Nautical Almanac pub. a list of astronomical Os. each year, but this ceased in 1911; it is hoped that the list will be continued in the 1952 and subsequent issues. *The American Ephemeris and Nautical Almanac* publishes a list every year.

'Observer,' one of the oldest London Sunday papers in existence, estab. in 1791. It was a comparatively obscure pub. until Wm. Inall Clement purchased a share in it some twenty years later, and organised it into the foremost Sunday paper. But though still a leading Sunday paper the *O.* of to-day is a radically different pub. from what it was in its earliest days, for it once relied for its success largely on its illustrations. Up to the time of Gladstone's Home Rule proposals the policy was Liberal, but thereafter it became Unionist. For long it was the only Sunday newspaper which pub. the latest foreign and home news of the previous Saturday. In 1905 the *O.* was bought by Lord Northcliffe (q.v.), who appointed J. L. Garvin as editor; the latter was retained when the paper passed to Viscount Astor in 1907, and under this regime the paper reached its present eminence. In 1912 Ivor Brown succeeded Garvin; Viscount Astor's son, David Astor, has been editor since 1918. Ownership of the paper is now vested in a trust. Its political policy is described as independent and non-party. Literary, dramatic, and musical criticisms are of a particularly high standard. The sales (1919) are over 400,000.

Observer Corps, Royal, uniformed civilian organisation under the operational control of R.A.F. Fighter Command which reports movements of aircraft and also gives aid by reporting the positions of aircraft in distress or which have crashed. Headquarters are at Bentley Priory, Stanmore, Middlesex. The corps was stood down on May 12, 1915, at the end of the war, but was reconstituted on Jan. 1, 1947, on a spare-time basis. In the Second World War its membership was 32,000, including 5000 women, and it had a network of 1420 posts reporting to forty operations rooms. Up to April 1941, when the title Royal was conferred upon it in recognition of its work in the battle of Britain, the corps was known as the Observer Corps. It was constituted as such in 1925, the members being special constables. In 1927 operational control passed from the War Office to the Air Ministry and in Aug. 1939 the Air Ministry also took over administration from the Home Office. To-day the R. O. C. forms a vital part of the first-line early-warning defence system of R.A.F. Fighter Command.

Obsessional Psychoneuroses, see under PSYCHONEUROSIS.

Obsidian, dark-coloured vitreous lava or volcanic rock, of varying composition, resembling common bottle-glass. It is generally black, but may be brown, red, or grey, or a combination of these colours. All Os. have a low sp. gr. because they are acid rocks and non-crystalline, and their lustre is vitreous. When broken, *O.* shows a conchoidal fracture similar to that of glass, and yields sharp-edged fragments largely employed by primitive races for spear-heads, knives, arrow-points, etc. *O.* occurs in the Lipari Is., Iceland, Hungary, Mexico, the Yellowstone Park, New Zealand, Ascension, and the Caucasus. *O.* was worked as a gem-stone by the ancients, Greeks, and Romans, and at the present time it is sometimes cut and polished as an ornamental stone.

Obstetrics (Lat. *obstetrix*, midwife; from *obstare*, to stand before), that part of the science of medicine which deals with the care of women in respect of child-birth. It is therefore a div. of gynaecology, which deals with diseases of women, especially with those affecting the organs of reproduction. Midwifery was in the hands of women until about the sixteenth century; indeed, the interference of a physician in the process of child-labour was looked upon as immoral. The transference of the midwife's function to trained physicians owes a great deal to the rediscovery of podical version by the Fr. physician Paré in 1550. This operation consists in manipulating the foetus in the uterus so as to bring the feet to the outlet; by this means children were safely delivered who could not otherwise have been born. Other notable developments have been the invention of the forceps by the Chamberlains, Huguenot refugees settled in London; the administration of anaesthetics initiated by Sir J. Y. Simpson in 1847; and the diminution of cases of puerperal infection by the use of antiseptics. Modern obstetricians are concerned with the process of parturition and the varying conditions met with, the employment of operative or instrumental measures if occasion calls for them, the care of the woman during the puerperium, or period during which the uterus is regaining its normal size, and the supervision of the new-born child's welfare during that period. The name 'accoucheur' is used to denote a person specialising in *O.*

Obwalden, see UNTERWALDEN.

Ocarina, musical toy wind instrument of metal or terra-cotta, in shape resembling a goose's (It. *oca*) egg. It was introduced into England by travelling Gers. or Tyrolean musicians, and sounds somewhat like a flageolet. There are usually eight or ten finger-holes, a whistle-like mouthpiece, and a large internal cavity. Modern instruments have a row of keys. The Chinese *hsuan* (c. 3000 B.C.) was perhaps its anc. prototype.

O'Carolan, **Turlough**, or **Carolan Turlough** (1670-1738), Irish bard, b. at Newtown, Co. Meath. Became blind after an attack of smallpox in 1684. Patrons furnished him with a servant and horses, and he

wandered with his harp through Connaught. O. composed his own songs and melodies.

O'Casey, Sean (b. 1881), Irish dramatist, b. in Dublin. Reared in the Dublin tenements, which often serve as a setting for his plays. O. exploited the sheer comedy, coupled with intense tragedy, to be found by discerning eyes in those grim slum dwellings. He read omnivorously as a boy, and began to write in his early thirties. His Abbey Theatre career began in 1923. His *Junio and the Paycock*, produced in 1925, was a great success in London. It was followed by *The Plough and the Stars* in 1926. These plays estab. him as master of comedy and pathos on the grand scale, native in idiom and convincingly true. 'They suggest, in symbolic form, the tragedy of Ireland itself, where idealism and vainglory, vision and vice, poetry and profanity were inextricably mingled' (A. C. Ward). He was always an experimentalist and forsook the purely realistic theatre for fantasy, as shown in *The Silver Tassie* (1928), and *Within the Gates* (1933), both expressionist plays and propagandist. 'Van Gogh,' he said 'and particularly Cézanne, took me the extravagance of Cubism its possibilities and, uniting these with the greater possibilities of Realism and Impressionism, burst into a new art in painting. Now that is what I want to do in Drama.' To those who relish propaganda on social and political problems these later plays were welcomed as masterpieces, but to others the excessive use of symbolic types in place of individual characters seemed to render them inferior as drama to his early work. O. has long been settled at Totnes. Other works include *I Knock at the Door* (1939); *Pictures in the Hallway* (1942); *Drums under the Window* (1945); and *Inishfallen Fare Thee Well* (1949), all autobiographical; and also *The Shadow of the Gunman* (an early play, 1915); *Windfalls* (1931); *Essays on the Theatre* (1937); *Purple Dust* (1940); *Oak Leaves and Lavender* (1946); and *Collected Plays* (1949). See S. Gwynn, *Irish Literature and Drama*, 1936.

Occam, William of, see OCKHAM.

Occasional Conformity. The Test and Corporation Acts were designed to exclude non-Anglicans from certain public offices by making attendance at communion a condition of service. To evade this barrier many nonconformists adopted the practice of taking communion occasionally to satisfy the Acts. The Occasional Conformity Act of 1711 made this practice illegal, but was repealed in 1718. An ann. indemnity Act, to permit nonconformists to hold office was in operation from 1727 to 1829.

Ooclevo, Thomas, see HOCCELEVE.

Occlusion. absorption of a gas by a metal. Many solids are capable of occluding gases when in a molten state, and the gas so occluded is usually emitted on solidification. Certain metals, notably the platinum metals, have the property of absorbing gases without being fused, especially when the metal is in a finely

divided state. Platinum black, for instance, takes up 100 times its vol. of oxygen, and 110 times its vol. of hydrogen; palladium absorbs over 600 times its vol. of hydrogen; iron, cobalt, nickel, copper, silver, and gold exhibit the phenomenon of O. in a lower degree. The intimate contact of these gases when occluded leads to chemical combination, in which great heat is evolved. Thus a jet of hydrogen or coal-gas directed against platinum black causes the metal to glow, and the jet is speedily ignited. The large proportion of hydrogen occluded by palladium led to the supposition that a definite compound, palladium hydride, PdH, had been formed, but recent chemical opinion does not favour the suggestion.

Occlusions, Cold and Warm, see under METEOROLOGY.

Occultation usually refers to the concealment of a star or planet by the moon. By its eastward motion it eclipses the body, which disappears behind the E. limb and reappears at the W. In the first half of the lunation, the E. limb being dark and the star a mere point, the O. is sudden, forming a most accurate means of determining the moon's position, and thus assisting in ascertaining certain inequalities of a very complicated nature in the moon's mean motion. When the Greenwich time is known the long. of a place can be found by noting the instant of O. but the comparative rarity of these phenomena renders this method of little practical use at sea. The phenomenon is confined to a belt of 10° 17' wide in the heavens. The O. of its moons by Jupiter may also be used to determine long., but for various reasons great accuracy is not obtainable in this way.

Occult Sciences, see under MAGIC; NECROMANCY; WITCHCRAFT.

Occupational Diseases. There are few occupations entirely free from risk of disease. Even agric. and other workers are liable, in consequence of exposure to the weather and the sun's rays, to contract cancer of the skin (epithelioma). Writers, telegraphists, and typists are all liable to cramp of the hand, musicians may acquire callosities and emphysema, whilst clergymen, as well as housemaids, are said to be liable to inflammation of bursa associated with the knee joint. Clergymen also suffer from laryngitis, a disease which they share with teachers, singers, and public speakers. Medical men, in addition to the obvious hazards of infection, are reputedly prone to attacks of angina pectoris, perhaps in consequence of the nervous strain to which they are subjected. The industrial diseases proper are governed by the Factories Acts, the most recent being passed in 1937 and 1948; the provisions of these Acts are supervised by inspectors of the Ministry of Labour and by examining surgeons specially appointed for the purpose. Most large factories now have their own medical and welfare workers. Many such diseases are subject to compulsory notification by medical practitioners; compensation of diseases and injuries is governed by the Workmen's Compensation

Acts of 1925 16. Industrial diseases include anthrax, or wool-sorters' disease, which affects chiefly the lungs and spleen, and is often fatal; cat-skin disease, common in divers if they are released too suddenly from high pressures; cataract and emphysema, which occur in glass-blowers. Workers in mines, tunnels, and sewers are sometimes attacked by spiriochetal jaundice (Weill's disease) and by hookworm (ankylostomiasis, *q.r.*). Poisons which may affect workers include metals such as lead, arsenic, antimony, mercury, and nickel; non-metallic substances, as for instance phosphorus, carbon disulphide, and a large number of coal-tar products (benzene, aniline, trinitrotoluene, picric acid, etc.) used in dyeing and as explosives; gaseous poisons, *e.g.* chlorine, arsine, and the gases of coal-mines. Other very important *O. D.* are pulmonary tuberculosis, silicosis, and asbestosis, caused by the inhalation of foreign particles; also dermatitis, ulceration, and cancer of the skin induced by irritating chemicals, such as alkalis, paraffin, chromium salts, tars, oils, and the like. Finally mention should be made of the risks to operatives using radio-active substances in medical work and atomic bomb factories. See J. R. Currie and A. G. Meurns, *Hygiene* (3rd ed.), 1948.

Occupational Therapy, psychological treatment, the success of which depends upon the transference of the patient's focus of attention from his disability to an objective centre, in this case to some congenial occupation. It originated as a treatment in mental hospitals, but it is becoming increasingly important in both general and mental hospitals. In mental hospitals activities are devised to hold the attention of the patient, and to encourage him to concentrate. In general hospitals *O. T.* is used whenever possible in conjunction with physiotherapy to stimulate circulation and muscle tone, and it plays an important part in the treatment of traumatic injuries, arthritis, tuberculosis, and paralysis. Among the many crafts which serve both to stimulate the interest of the patient, and at the same time to exercise special muscles, are weaving, spinning, table weaving, joinery, book-binding, leatherwork, pottery, rug-making, country dancing, and other recreational activities. Throughout the course of treatment the occupational therapist works under medical direction, in the early stages in co-operation with the nurses and physiotherapists, in the convalescent stage with technicians and recreational training experts, and in the final stages with industrial psychologists and others. *O. T.* thus takes an important part in the eventual rehabilitation of the patient.

Experiments in *O. T.* were first carried out in Great Britain during the First World War, mainly by craft-workers untrained in the medical side. Between the two wars a group of people began to realise the importance of a specialised training for occupational therapists, and in 1930 Dr. Elizabeth Casson founded the Dorset House School in Oxford. Other

schools quickly followed, and the Association of Occupational Therapists was formed in 1936 with Sir Hubert Bond as president, and Mrs. Glyn Owens as first chairman. Membership is limited to those who hold the association's diploma, or that of an approved school obtained before the establishment of the association's examinations, the first of which was held in 1938. A fully qualified occupational therapist has a working knowledge of anatomy, physiology, psychology, and first aid, and also departmental management, general medicine, and surgery, together with some knowledge of either psychiatry, psychopathology, and *O. T.* applied to psychiatric conditions, or advanced anatomy and physiology, physical medicine, and orthopaedics, according to specialisation. Added to this is a knowledge of at least ten crafts. See R. H. Finnegan, *Occupational and Physiotherapy*, 1948.

Ocean and Oceanography. *Os.* or surfaces of continuous water, as distinct from the enclosed and shallow seas, cover about 140,000,000 sq. m., comprising 71 per cent of the total surface area of the globe. Their mean depth is estimated at 2080 fathoms (12,480 ft.), as compared with the mean height of the land, 375 fathoms (2250 ft.).

Distribution. In the N. hemisphere the proportion of land to water is 2 : 3; in the S., 1 : 1.7. There is a 'land hemisphere,' however, centred on the bay of Biscay, in which the proportions are nearly equally distributed, and a 'water hemisphere' centred on the S.W. Pacific, in which the water covers an area ten times that of land. The arrangement of the *Os.* and the continents is an almost symmetrical alternation. The Arctic *O.* around the N. pole is antipodal to the high Antarctic continent. The S. circumpolar *O.* matches the almost complete ring of land round the Arctic basin.

The two great *Os.*, the Pacific and the Atlantic, cover sections of 150° and 90° respectively in the S., and then taper northwards between the continents to their shallow and narrow connections with the Arctic *O.* The Indian *O.* covers a sector of 120° in the S., and is enclosed by a semicircular sweep some 20° N. of the equator. An attempt was made to explain the rough antipodality of the great *Os.* and continental regions, as well as their shapes and symmetrical arrangement around the poles, in the well-known but now discredited Tetrahedral Theory (see MOUNTAINS).

Importance. -The greatest influence of the oceanic bodies of water is that of moderating and regulating the climatic conditions of the earth. They are the great source and store of moisture brought by winds as cloud and rain to the lands. Their reactions with the sun's heat differ from, but delicately counterpoise, those of the land, and prevent the development of extremes of temp. in their bordering regions. In brief, proximity to the *Os.* determines to a very large extent the habitability, development, and even character of the pop. of certain regions,

e.g. the monsoon countries of S.E. Asia. The deep-sea fisheries centred off the banks or oceanic shallows are of vast importance, and the Os. also are of the greatest value as highways of commerce. The N. Atlantic O. may be regarded especially as one of the controlling factors in the supremacy and progress of the great W. European and Amer. peoples. Its contributing land margin is considerably more extensive than that of the Pacific or the Indian O., since much longer and greater rlys. drain into it. (For further special characteristics see PACIFIC, ATLANTIC, etc.)

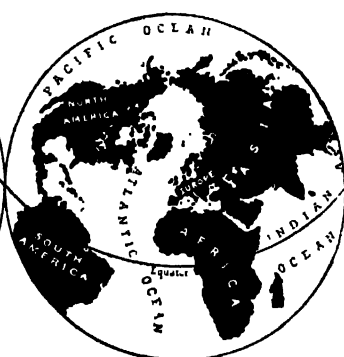
Temperature. The mean ann. surface temps. of the O. vary from over 80° F. within the tropics to freezing point in polar seas. The surface temp. of the sea changes markedly from place to place,

usually felt to a greater depth than 300 fathoms, there is a lag in the seasonal change of temp.; and whereas in our lats. the hottest time of the year is June, the water, on account of the slow warming up of the sea, does not reach its maximum temp. until Aug. There is a further lag in the warming of the deeper water, until at about 50 fathoms there is a complete reversal of seasons. There the hottest time of the year is in Dec., and the coldest about May-June. Below 100 fathoms there is no seasonal change at all in temp., and, year in year out, the conditions are uniform. From this depth downwards the temp. gradually falls until in the O. abysses it remains constantly at somewhere near the freezing-point.

Pressure. The pressure in the sea varies with the depth. At every ten metres it is



WATER IN HEMISPHERE



LAND IN HEMISPHERE

In the tropics it is hot compared with the polar regions. The highest recorded temp. is 96° F. in the Persian Gulf, the lowest 28° F. in polar seas; and between these two extremes all temps. are to be found. Though the specific heat of sea water is less than that of fresh, it is still high, and therefore, as compared with land, the Os. remain cool in summer and warm in winter, accounting indirectly for the oceanic climate of marginal lands. There is very little daily variation, and, except in the temperate regions, only a small ann. range of temp. in the surface waters. The vertical distribution of temp. has some notable features in common throughout the Os. There is a rapid decrease of temp. to about 200 fathoms, with a further slower fall to about 1200 fathoms, after which only slight changes take place. The most striking fact is the uniformity of temps. at great depths in all lats., bottom temps. varying only from 30° F. in high lats. to 35-40° F. in the N. Atlantic and Pacific Os. The freezing-point of sea water is about 28° F. In enclosed seas like the Mediterranean, anomalous conditions arise as the result of the presence of submarine barriers. Owing to the fact that the sun's warmth is not

increased by one atmosphere, i.e. by one stone to the sq. in. In the great depths the pressures rise to 3 tons to the sq. in. Yet there is no part in the Os. in which animal life cannot be supported. The great pressures in the depths of the O. have a slight effect on the water's density, but, water being almost incompressible, the increase in density with depth is very small. It can in no way be sufficient to support a prevalent but utterly erroneous popular belief that, owing to the increasing density, objects sinking will find their own level before they reach the bottom, a level in which the density is the same as theirs, and below which they cannot sink because the density of the water becomes greater (see on this F. S. Russell and C. M. Yonge, *The Seas*, 1928). One of the effects of living at these great pressures is that when animals are brought up quickly in a trawl they break to pieces on account of the sudden reduction of pressure. In the laboratory small unicellular animals have been subjected to pressures of as much as 600 atmospheres without suffering any apparent harm.

Light. - The amount of light to be found at any depth of the O. depends on the altitude and strength of the sun, on the

weather conditions, and upon the turbidity of the water. It is seldom that all the light from the sun penetrates the actual sea surface; this only happens when the sun is vertically overhead and the sea perfectly calm. But the rays that do pass through the surface cannot penetrate to the bottom in very deep water. In the great O., the darkness on the sea-floor, thousands of fathoms below the surface, is absolute, the light being absorbed completely by the water. But not all the different colours of which white light consists are absorbed to an equal extent; thus red rays are quickly absorbed but blue and violet light penetrate much further, while in clear O. waters, such as the Sargasso Sea, violet light may be present at over 500 fathoms, though its strength is necessarily very weak. An excellent example of the absorption of light by sea water is supplied by the celebrated cave at Capri called the Blue Grotto, within which everything is enveloped in the purest blue light. The explanation of this phenomenon is that the only light that can enter the cave itself has to pass first beneath the water which practically fills its narrow entrance. The blue colour of the sea is also due to the same phenomenon, for the colour of the water is due to the reflection of light upwards from the small particles suspended in the water; much of the remaining red and yellow light has become absorbed in this upward journey, and it is mostly the blue and green light which can survive to appear above the surface and so lend to the sea its typical hue. As all these rays of light are being absorbed in their downward passage it follows that the actual strength of the light is gradually being reduced as the water gets deeper. In the open O. the strength of light is too weak at 100 fathoms to support very much plant life, while below that depth few living plankton plants are to be found. None the less this upper layer of water, 100 fathoms thick, is sufficient to sustain a great mass of plant life that forms the sea's pasturage, and it is on the dead plants and organisms that have fed on them that the animals in the dark O. depths depend for their food.

Composition and Salinity. Oceanic water contains nearly 200 times the dissolved salts of fresh water. Its 'salinity' is usually expressed as the amount of dissolved salts contained in 1000 parts of water, an average value being about 3.5 per 1000, or 3.5 per cent. Regions of heavy rainfall, slight evaporation, or large ingress of fresh water have a low salinity. In the Baltic Sea, for instance, the salinity is very low, being always below 29 parts per 1000. Down at the mouth of the Baltic, however, where it meets the North Sea in the Skagerrak, there is a considerable rise in the salinity due to the mingling of more saline waters from the North Sea itself and from water borne round by the drift of the Gulf Stream which penetrates the North Sea off the N. of Scotland. Regions of the trade winds and permanent anticyclonic conditions show high salinity, but the enclosed seas, the Mediterranean

and the Red Sea, are highest. The most striking contrasts of salinity, however, are a surface feature only, and are greatly reduced in deeper waters. In the case of the Dead Sea riv. water has been pouring down for thousands of years into a comparatively small lake in which constant evaporation is taking place, and, as a result, the enormous salinity of over 200 parts per 1000 has been reached.

According to Dittmar's analysis of samples collected by the famous *Challenger* expedition, the composition of sea-salts is:

	Parts per 1000
Sodium chloride	27.213
Magnesium chloride	3.807
Magnesium sulphate	1.658
Calcium sulphate	1.260
Potassium sulphate	0.863
Calcium carbonate	0.123
Magnesium bromide	0.076

35.000

It is now known, however, that this does not give an accurate representation of the dissolved substances, since they are present mainly as ions, one-tenth only of the solids being present as true salts. On the whole, therefore, there is an excess of bases over acids, so that sea-water has an alkaline reaction. Moreover, the actual composition of sea-water salts, i.e. the ratio of bases and acids, remains constant in all parts of the O. and at all depths away from contact with the shore and the bottom.

Density. This varies with both the salinity and the temp. on the surface. It also increases with depth from a mean of 1.025 at the surface to one of 1.028 at the bottom. Even small differences in density, however, have most important effects on oceanic circulation.

Depth. The greatest depth which has been sounded (Ger. cruiser *Jordan*, 1927) is 35,110 ft. some 10 m. S.E. of Mindanao, Philippine Is. The largest area is always that between 2000 and 3000 fathoms, 18 per cent in the Atlantic, 59 per cent in the Indian, and 65 per cent in the Pacific. Only 6 or 7 per cent exceeds 3000 fathoms, this comprising the trough or basin-like 'deeps.' These deeps are not numerous; there are fifty-seven, thirty-two of which are in the Pacific, five in the Indian O., nineteen in the Atlantic, and one lying partly in one and partly in the other of the latter two O's. Each deep is named after some well-known oceanographer or research ship. The deepest sounding in the Atlantic is 5227 fathoms off Puerto Rico. Elsewhere the 'abyssal plain' has a configuration of depressions, rises, and plateaux, though details are only imperfectly known. At the margins it rises through the 'continental slope' to the 'continental shelf,' a sill of very varying breadth with a maximum depth of 100 fathoms. This has a very great influence on the tides.

The deposits on the O. bottom have been classed as follows:

(1) *The Terrigenous*, including *Littoral*,

between high- and low-water marks, sands, gravels, muds, etc. *Shallow Water and Neritic*, less than 100 fathoms—the same plus organic remains. *Continental or Hemipelagic*: Blue mud, dark and slaty in colour, due to the formation of ferrous oxide and ferrous sulphide from the ferric oxide in the presence of decomposing organic matter. Shell fragments do not form a large percentage; red mud, in which the ferric oxide is sufficiently abundant not to be completely reduced, and green mud, really another variety of blue mud characterised by the abundance of the green mineral glauconite of land or organic origin; volcanic and coral muds and sands occur in the regions of volcanoes and coral formation.

(2) *The Pelagic or Deep Sea*. These are oozes due to siliceous and calcareous organisms, mostly microscopic. These are globigerina, very widely spread, especially in the Atlantic, pteropod, typical of the summits of rises, and diatom (microscopic plants), covering an Arctic belt and part of the N. Pacific. Red clay is found in the deepest parts of the O., especially the Pacific, while a local variety 'radiolarian ooze,' is limited to the deeper parts of the Pacific and Indian O. Around the poles, especially in the Antarctic O., the surface waters contain vast numbers of diatoms, each of which is enclosed in a delicate case of silica, and it is these minute plant 'skeletons' which form the prin. constituent of the deposits in these regions, hence called diatom ooze. Another type of deposit, which is strictly a variety of globigerina, is called pteropod ooze; it is named from the predominance in it of the limy skeletons of swimming snails known as pteropods or 'sea butterflies,' which are commonest near the equator where this type of ooze is exclusively found, always in shallower water than globigerina ooze and, particularly, near coral is., and on submerged elevations far from land. Beneath a certain depth oozes with limy shells as their chief constituents are no longer found, all calcareous matter having been dissolved away. At the greatest depth of all even the silica of the minute animals known as radiolaria is dissolved and the deposits then consist exclusively of what Murray called 'red clay,' a true clay which has been formed by the prolonged action of the sea water on volcanic dust which is all that has remained after the long journey from the surface to the bottom. In this red clay are found spherules probably of meteoritic origin, and also the insoluble teeth of sharks and ear-bones of whales.

Circulation. The surface currents of the O. are due mainly to winds, though the shapes of land masses often control their direction. In each hemisphere great swirls (centred near Cancer and Capricorn) are formed by the agency of the trades and westerlies, clockwise in direction in the N. hemisphere and anticlockwise in the S. hemisphere. These induce minor counter-currents along the equator. In the Atlantic and Pacific warm currents run off to the N. and S.

along their W. sides, and cold currents flow from the Arctic and S. O. along their E. sides towards the equator. A belt current circles the globe in the 'Roaring Forties.' In the N. Indian O. the currents change with the monsoons. The influence of these currents, together with the winds above them, is the determinant of climate for oceanic land margins, a marked effect being that in the tropics, where the E. continental margins are warm and humid, the W. tending to desert conditions. The warm and cold branches in higher lat., produce climatic contrasts in similar lat., as, for example, between W. Europe and Labrador. Within the great 'whirls' are large areas of practically still water, covered with a mass of living, floating weed known as sargassum. In addition to the surface circulation (see further under ATLANTIC, PACIFIC, etc.) there are sub-surface currents which have only recently been investigated. These movements are in the nature of creeps affecting distinct zones or layers of water, differing in temp., salinity and density. There is a definite bottom creep of very cold saline water from polar regions to the equator. Slow and more or less vertical currents are set up by the 'welling up' of this water, compensated by downward movements of dense saline water near the tropics. There is still a great need, however, for a more complete and systematic study of O. waters and their circulation.

Sea level. The level is disturbed by high evaporation, rainfall, inflow of rivers, melting and formation of ice, heaving by prevailing winds, differences of barometric pressure, etc., and also by the gravitational attraction of large land masses. The waters of the Mid Indian O. are lowered 1500 ft. by the attraction of the mt. masses of the Himalayas.

Life in the O. is possible mainly because of the absorption of oxygen by sea-water, to the extent of about 8 c.c. per litre. That this dissolved oxygen is found in all sea-water, even in very deep areas, is due to its constant renewal by very slow vertical currents derived originally from the surface. Absolutely stagnant water does occur in the depths of the Black Sea and some Norwegian fjords—the oxygen content has long been removed and therefore no organic life is possible. (See further under BIOLOGY; BOTANY; FISH.)

Scientific Oceanographical Investigation received its great impetus in connection with the laying of submarine cables about 1855. Kircher had in 1661 attempted a map of O. currents, but before that interest lay in the wind circulation. Saussure made observations of temps. at great depths in 1780, Rennell attempted a scientific account of the currents between 1742 and 1830, while Arctic exploration added to knowledge. Capt. Cook, Sir J. In Ross, and others took true deep-sea soundings, and Br. Blake in 1850 introduced a method of bottom-deposit at the same time. In 1857 H.M.S. *Cyclops* made observations of temp. with a self-registering sheathed thermometer. M. F. Maury pub. his *Physical Geography of the Sea* in 1856, the

result of investigations organised by the U.S.A. Hydrographic Office, and this led to similar research being undertaken by many countries. In England Forbes, Michael Sars, Wyville Thomson, and Carpenter gave a start to marine biology. Their work led to the dispatch of the great *Challenger* expedition by the Brit. Gov. for complete investigation of the O. This great voyage, 1872-76, led to a systematic scheme of oceanography and to great improvements in instruments and methods.

Other famous expeditions sent out by many nations include *Vorign*, Norwegian, in N. Atlantic, 1876-78; *Travailleur*, Fr., bay of Biscay, 1880-83; *Tufoff*, Dan., 1896; *Blake* and *Albatross*, Amer., Atlantic, Caribbean, and Pacific, 1877-1901; *Princess Alice*, Prince of Monaco, N. Atlantic, from 1888; *Vaidua*, Ger., Atlantic, Indian, and S. Os., 1898-99; *Siboga*, Dutch, Malay Archipelago, 1900; *Meteor*, Ger., S. Atlantic, 1925-27; *Albatross*, Swedish, Pacific O., 1917-48. The expeditions of the *Gauss*, *Helgva*, *Scotia*, *Fram*, *Discovery*, *Discovery II*, etc., added immensely to the science of marine biology and to the knowledge of conditions, especially in Arctic and Antarctic waters. An International Council for the exploration of the sea and marine laboratories in many parts of the world have been estab.

Methods and Instruments. - The increasing study of the oceans has resulted in a great improvement of methods and instruments used in deep-sea work. For surface observations ordinary instruments can be used, but for sub-surface work special instruments, the actions of which can be controlled, have to be employed. Thus for temp. observations reversing thermometers, registering at any desired depth, are used. Samples of water for the determination of salinity are obtained by sending reversing water-bottles down to any required depth, these carrying sometimes reversing thermometers. A messenger consisting of a small metal weight is sent down the line to effect reversal. The Pettersen-Nansen water-bottle, however, is insulated and sealed by a small propeller, which is set in motion when the ascent begins, so that the unaltered temp. can be read off directly. Photometers are used for investigating the penetration of sunlight into the sea; the plates are exposed and covered again by sending down messengers. Many instruments are used for the measuring of the velocity and direction of currents. Drifting objects, like icebergs, wreckage, or drift bottles, give information regarding surface currents, but for direct measurements of under-currents Ekman's ingenious self-recording current meter is favoured. Hydrometers and densimeters are employed for the determination of density and relative densities of samples. One of the most important branches of oceanographical research is deep-sea sounding. A depth sounding on the *Challenger* with the stout hempen cable and lead took sev. hours. With the modern Lucas sounding machine an economy of time and more accurate results are achieved. Steel piano wire is run out from the drum until the sinker

touches bottom and becomes detached, when the depth is automatically recorded. The latest method, however, is by echosounding apparatus, with which continuous soundings can be taken by a ship under way. Depth is calculated by timing the echo, or sound wave reflected from the sea floor, produced by a controlled explosion in the ship's bottom. This apparatus, however, cannot replace the Lucas sounding machine, with which it is possible to obtain a specimen of the bottom deposit in closing tubes on a grab during the process of sounding. Dredges and trawls, up to 50 ft. span, are used for obtaining specimens of bottom life, while tow-nets and vertical nets and trawls, which can be opened or closed at desired depths, and which are made of extremely finely meshed silk, are used to capture animals and plants in intermediate waters. Many marine organisms are so small, however, that they have to be concentrated into drops for microscopic examination by large and hand centrifuges.

Persistence of the Ocean Basins. - There has been much discussion as to the persistence of the deep O. areas beyond the limits of the continental shelf. The absence of geological representatives on land of the deep-sea oozes led to the theory of persistence, particularly elucidated by Wallace, Lord Kelvin, and Jukes-Brown. They have, however, been recognised in such oceanic marginal lands as Barbados, Cuba, Borneo, and elsewhere. The distribution of plants and animals appears to require the non-persistence of Os, or the presence of 'land bridges' across present O. basins. Wegener has postulated the shifting of continents in the geological past by the splitting up of a large primeval continent and the drift of its parts towards the equator and towards the W. This continental drift theory is based on the well-established difference in the composition of the continental blocks and the O. floor. The former consist of lighter rock materials making up the 'sial', and are supported in the denser materials of the O. floor termed the 'simu'. They may almost be compared to icebergs floating in water. See also HYDROMETER; NAVIGATION; RIVER; SEA; SOUNDING; TIDES; WAVES AND SWELL; WINDS.

See W. C. Thomson and J. Murray, *Report on the Scientific Results and Narrative of Cruise of H.M.S. 'Challenger', 1882-1895, and Summary of Scientific Results*, 1897; O. Krumm, *Handbuch der Oceanographie*, 1907-11; J. Johnstone, *An Introduction to Oceanography*, 1923; A. Wegener, *The Origin of Continents and Oceans* (trans.) 1924; G. Schott, *Geographie des atlantischen Ozeans*, 1926; Sir J. Murray, *The Ocean*, 1928; F. S. Russell and C. M. Yonge, *The Sea: our Knowledge of Life in the Sea and how it is Gained*, 1928; E. G. Boulenger, *A Natural History of the O.*, 1935; T. A. Ryder, *Mother Earth*, 1948; F. D. Ommann, *The Ocean*, 1949; and F. G. Lane, *The Mysterious Sea*, 1949.

Ocean Falls, to of Brit. Columbia, Canada, 350 m. N.W. of Vancouver. There are large pulp and paper works. Pop. 2790.

Ocean Grove, summer and seaside resort, 55 m. S. of New York city by rail, in Monmouth co., New Jersey, U.S.A. It is noted for its Methodist camp meetings, and also for its concerts. Pop. 2900.

Oceania, general or collective name for the groups of is. in the S. and central Pacific Ocean or South Seas, comprising all those intervening between the S.E. shores of Asia and the W. shores of America. Physically O. includes all the is. from Australia to the Marquesas and the Low Archipelago, and from New Zealand to the Hawaiian group. The main divs. of the region are the three large is. Australia, Tasmania, and New Guinea, and the three is. groups Melanesia (*q.v.*), including the Solomon Is. (*q.v.*) and New Hebrides and New Caledonia, Micronesia (*q.v.*) including the Carolines and Ladrões, and Polynesia (*q.v.*), extending from New Zealand to Hawaii. The most important group is the Australian chain or chains stretching from New Guinea to Macquarie Is. and including the Papuan Is. and New Caledonia. The grouping into Melanesia, Micronesia, and Polynesia is a loose ethnic classification. Most of the small is. are coral atolls, though some are of volcanic origin. O. is divided among Britain, France, Japan, Australia, New Zealand, U.S.A., and Chile.

Océanie Française, see FRENCH OCEANIA.

Ocean Island is situated in the Pacific Ocean, 0° 52' S., 169° 35' E. In 1901 the is. was taken under Brit. rule, and in 1916 was formerly annexed to the Gilbert and Ellice Is. colony. It is very rich in high-grade phosphate; in 1921 the Brit. Phosphate Commissioners purchased the working rights from the Pacific Phosphate Company. The Jap. occupied the is. during the Second World War until 1945, deporting the pop., which numbered 2500. O. Is. is 6 m. in circumference.

Ocean Steam Navigation Company, see WHITE STAR.

Oceanus, deity of Gk. mythology. Homer pictures O. as a great belt of riv. sweeping round the earth, and as the father of all things, even of the gods. Herodotus and the later Gk. poets, like Euripides, identify him with the sea, and in after time he became synonymous with the Atlantic. Herodotus explains that he was the son of Uranus and Gaia, the husband of Tethys, and the father of all the great rivs., besides 1000 sea nymphs or Oceanids.

Ocellus, Lucanus (fl. c. 500 B.C.), Lucanian Gk., and member of the Pythagorean school, named from his bp., Lucania in Italy. He is said to have written various philosophical works, but the only one extant is his *On the Nature of the Universe*, in the Ionic dialect, maintaining the doctrine of the eternity of the world.

Ocelot, Panther-cat, and Tiger-cat are popular names applied to *Felis pardalis*, a species of Felidae found in tropical America. It is a beautiful animal, averaging in length from 2½ to 3 ft., and has a tail about 1 ft. long; the colour is usually tawny, with dark spots or bars. The O. is a good climber, and feeds for the

most part on birds caught in its native forests.

Oc-Eo, anct. city of Cochin-China, lay in what is now a treeless marsh, about 110 m. N.E. of Cape Cambodia, the southernmost tip of Cochin China. The remains of the city cover an area of about 450 hectares, bisected by a canal running away to an outpost 16 m. distant at Tac-Eo on the W. shore of the gulf of Siam. O.-E. flourished from the first to the ninth century A.D., its civilisation preceding that of the Khmers (sixth to fifteenth century), hitherto the earliest known civilisation of Indo-China. The site was dug by Louis Malleret in 1912-15. Inscriptions found on small objects are written in the Brahmi script of Sanskrit. Chinese influence developed over the centuries, and it seems clear that the city was part of the kingdom of Fu-Nan. There is evidence of contacts with the Greco-Rom. world, with the Srythans of N. India, and with the Persians. Architecturally heavy masonry was supported on timber, which latter has collapsed with the consequent ruin of the whole structure. The bulk of the pop. was of Indonesian and Negrito stock, ruled by an Indian, probably N. Indian, aristocracy. The reason for the decline of O.-E. is not certain, but may have been a change in the level of the land.

Ochil Hills, range of hills in Scotland, in Perthshire, Clackmannan, Kinross, and Fifeshire. They extend for about 25 m. from the Tay, near Perth to the bridge of Allan. The highest summit is Ben Clouch, 2363 ft. Coal, iron, copper, and lead are found, and rich pasture is afforded to sheep and cattle.

Ochino, Bernardino (1487-1564), It. reformer, was b. at Siena. A friar at first, he was vicar-general of the order of Capuchins, but, fearing the vengeance of the Inquisition for his heretical sermons, he fled to Geneva, and attached himself to Calvin. He confirmed his apostasy by marriage, and after travelling as a Protestant preacher, accepted from Crammer a prebend at Canterbury, and pub. in Lat. his spirited *Tragedy or Dialogue* against the pope. But his apology for polygamy and his attack on the Trinity brought him into utter discredit with the Reformers, and eventually he died a miserable death from plague in Moravia. See lives by K. Berath, 1892, and E. Negri, 1912; also A. Stückl, *Christus in Italien*, 1936.

Ochra, Okro, Gobbo, or Gombo, names for the pods of *Hibiscus Abolmoschus* (synonym *Abelmoschus esculentus*), a plant belonging to the family Malvaceae, which is cultivated as a food in the N.W. of India.

Ochre, name given to sev. varieties of native earths, which consist of a mixture of hydrated oxide of iron with silica and alumina. They range in colour from light yellow to brown. The incrustation of oxides of other metals, antimony, bismuth, nickel, etc., are also called Os., though they are not so important. Red and yellow Os. are prepared by grinding and washing, and are extensively used as

pigments. O. is found in sev. parts of England, notably in Anglesy and Devonshire; also in Canada, France, India, and S. Africa.

Ochrida, Okhrida, or Orid, tn. of Yugoslavia, on the frontier between W. Macedonia and Albania. 28 m. N.W. of Monastir, on Lake O. It was the seat of a Bulgarian bishopric. There is a Rom. fortress and other anct. buildings. Pop. 10,000.

Ochs, Adolph Simon, see under 'NEW YORK TIMES'.

Ochterlony, Sir David (1758-1825), Brit. soldier, b. in Boston, Massachusetts. He joined the Indian Army in 1777, and first distinguished himself as the defender, with a small garrison, of Delhi against Holkar's invading army of 20,000 (Oct. 7, 16, 1804) until the siege was raised by Lake's army. He held the Sikhs in check on the N.W. frontier, and eventually concluded a treaty of peace with their leader, Ranjit Singh (1808). In 1811, in the campaign against the Nepalese, he captured the fort of Nalagar, and followed up this success by taking Malau, which was defended by the gallant and skilful Amar Singh, whom O. permitted to march out with his arms and colours and personal possessions. O. was made K.C.B., and, later, baronet, and given a large pension by the E. India Company (1815). Later, taking the field against the Ghurkhas he advanced on Khatmandu, and defeated them decisively at Hariharpur. The Nepalese then ratified the treaty which previously they had rejected (1816). For these services O. received the thanks of Parliament, and the award of the G.C.B. His last campaign was against the Maratha chiefs, and the Pindaris, and he succeeded in dividing the two major bodies of the Pathan forces without striking a blow (1818). O. was a skilful soldier and diplomatist, and had a great knowledge of Indian character, languages, and social life. A column was erected to his memory in Calcutta. See C. MacFarlane, *Our Indian Empire*, 1844; J. C. Marsham, *History of India*, 1867; and Sir G. Dunbar, *A History of India*, 1941.

Ochus, see ARTAXERXES III.

Ocimum, genus of half-hardy annuals and shrubs (family Labiate), bearing whorls of white flowers. *O. basilicum* is the sweet or common basil, which is grown in kitchen gardens. See BASIL.

Ockham, or Occam, William of (b. c. 1290-1300; d. c. 1349), called 'Doctor Singularis et Invincible', Eng. schoolman, was born at O., Surrey. He probably studied at Oxford as a member of the Franciscan house there, but not, as has often been stated, at Merton College. In Paris he became associated with the celebrated Marsiglio of Padua, on whose political opinions he exercised considerable influence. Like his master, Denis Scotus, whose rival in philosophy he afterwards became, he belonged to the order of Franciscans. O.'s eminence rests on his work in logic, in philosophy, and in political theory. In the first two he strongly influenced the opinion of his day, while in the last he deeply agitated the Church.

In his political writings he supported the secular power as against the claims of the papacy, and was cited before a papal court in consequence. In philosophy he revived the tenets of nominalism in a modified form. The *Dialogus* gives the most complete expression of his religious views. He must not be confounded with Wm. de Ockham, archdeacon of Stow in 1302. See further under KNOWLEDGE. See E. A. Moody, *The Logic of William of Ockham*, 1935.

Ockingham, see WOKINGHAM.

O'Comhraidhe, Eoghan, see O'CURRY, EUGENE.

O'Connell, Daniel (1775-1847), 'The Liberator,' Irish patriot and orator, b. at Carhen, near Cahirciveen, co. Kerry. In 1798 he was called to the Irish Bar. As a lawyer he displayed an exceptional gift for examining witnesses, whilst his vigorous and earnest oratory exercised a powerful influence over the jurymen, as later over the House of Commons, to which he was returned in 1828. The year 1829 saw the emancipation of the Irish Catholics, a reform which would never have come so soon had it not been for O'C. In 1841 O'C. began his second and greater agitation, this time for the repeal of the union. Peel was then at the head of a Tory Cabinet, and O'C. realised that the Catholics of his country would win nothing from a Tory gov. The activities of the Catholic Association were revived, and huge mass meetings were everywhere organised. O'C. felt confident of success, when he was condemned to prison on a charge of sedition (1844). A few months later he was set at liberty, but a shattered constitution and a devastating famine combined to defeat his ends.

See lives by W. Egan, 1817; M. Cusack, 1872; J. O'Rourke, 1875; J. Hamilton, 1888; and D. Gwynn, 1929; see also J. O'Connell (ed.), *Life and Speeches*, 1846; W. J. Fitzpatrick (ed.), *O'Connell's Correspondence*, 1888; R. Houston, *Daniel O'Connell: his Early Life and Journal*, 1906; and M. MacDonough, *O'Connell and the Story of Catholic Emancipation*, 1929.

O'Connor, Feargus Edward (1791-1855), Irish agitator and Chartist, b. in Ireland, was called to the Irish Bar, but it is as a politician he became notorious. He was an active supporter of the Reform Bill of 1832, and was returned to Parliament for co. Cork. After being unseated for lack of the required property qualifications he allied himself with the 'physical force' Chartists. From 1847 he sat in the House of Commons for Nottingham. He was in 1852 declared to be insane, and was placed under control.

O'Connor, Thomas Power (1818-1929), Irish journalist and politician, b. at Athlone. He entered journalism as a junior reporter on *Saunders' Newsletter*, a Dublin Conservative journal. He became a sub-editor on the London *Daily Telegraph*, but gave this up for an appointment in the London office of the *New York Herald*. In 1880 he entered Parliament as member for Galway, and became a prominent personality in the Parnell

party. In 1885 he ceased to represent Galway, and became M.P. for Scotland div. of Liverpool. He remained so for the rest of his life, becoming Father of the House on the death of Campbell-Bannerman. He was made privy councillor 1924. 'Toby M.P.' of *Punch* christened him 'Tay Pay'; and he founded and ed. *T.P.'s Weekly*, *M.L.P.*, the *Star*, and the *Weekly Sun*. His pubs. include *Lord Beaconsfield: a Biography* (1879); *Gladstone's House of Commons* (1885); *The Parnell Movement* (1886); *Napoleon* (1896); *In the Days of my Youth* (1901); *Memoirs of an Old Parliamentarian* (1929); and numerous essays and articles. See life by Hamilton Fyfe, 1934.

Oconto, city of Wisconsin, U.S.A., in O. co., on the O. R., at the entrance into Green Bay, 25 m. N.E. of the head of the bay. A centre for the lumber trade. Pop. 5400.

Ocotea, or **Oreodaphne**, genus of tropical Amer. trees (family Lauraceae), bearing long alternate leaves and racemes or panicles of small green flowers. *O. bullata* is sometimes grown in the greenhouse. *O. opifera* exudes a volatile oil.

Ocotlan, port of Mexico, on Chapala Lake. Fruit and cereals are shipped. Pop. 15,000.

Octahedrite, see ANATASE.

Octane (C_8H_{18}), is the name given to those hydrocarbons of the paraffin series which contain eight carbon atoms. There are eighteen compounds having this formula, many being known. The normal C_8H_{18} (CH_3)₇ (CH_3)₈ is a colourless mobile liquid, sp. gr. 0.702 at 20° C., boiling point 125.5° C., and is found in petroleum. It may be obtained in the pure state by heating octyl iodide with zinc and dilute hydrochloric acid. It may also be synthesised by heating *n*-butyl iodide with sodium. Iso-octane (β -methylheptane) is a colourless liquid, boiling at 116° C., and has a sp. gr. of 0.7035; it may be synthesised by the action of sodium on a mixture of propyl and isoamyl iodides, and fractionally distilling the product.

Octane Number, percentage of an octane (2, 2, 4, trimethylpentane) in a mixture of this octane with *n*-heptane which behaves, as far as 'knocking' in an internal combustion engine is concerned, with a petrol to be characterised by the O. N. The octane shows little tendency to 'knock' but the heptane has a very low resistance to it. Hence a petrol with a high O. N. will not 'knock' easily.

Octave, interval in music comprising eight notes of the diatonic scale, called the tonic, supertonic, mediant, subdominant, dominant, submediant, leading note, and O. It has six tones or twelve semitones. The O. of any note always has exactly double the number of vibrations per second of that note, giving the ear an effect of unison. There are usually seven Os. in the piano-forte. In ecclesiastical usage the O. of a festival is the period of eight days including and following the festival, or the seventh day after it. Thus New Year's Day is the O. of Christmas Day.

Octavia: 1. Sister of the Rom. emperor Augustus. She first married Marcellus, consul, in 50 B.C., and on his death became the wife of Mark Antony (40 B.C.), who, however, forsook her in a short space of time for Cleopatra, which led to the war between Antony and Augustus. O. was noted for her beauty and womanly virtues. She d. in 11 B.C. 2. Daughter of the Emperor Claudius and Messalina, b. c. A.D. 10, and wife of Nero, who in A.D. 62 divorced her on account of her being barren, and later accused her of unfaithfulness, and had her put to death in A.D. 62.

Octavian, see JOHN (popes), *John XII*.
Octavo, term used in bookbinding for a book or sheet of printed paper which has been folded three times, or one-eighth of its original size, and so forming eight leaves or a section of sixteen pages. The word O. is generally abbreviated to 8vo, and certain sizes of books are classified as foolscap 8vo, demy 8vo, royal 8vo, crown 8vo.

Octet, composition for eight instruments, usually in sev. movements, and in some kind of sonata or suite form. An O. may also be vocal, but would not then be given the name O. as a title, and it would probably be merely an incidental section for eight voices in a larger composition.

October (Lat. *octo*, eight), originally the eighth month of the old Rom. calendar, the year beginning in March. It retained its old name in the Julian calendar, but then became the tenth month with thirty-one days. The Slavs term it 'yellow month', from the falling of the leaf, and an old name for it in Germany was 'wine month.' In England it has long been the chief month for brewing. The prin. eccles. feasts celebrated during the month are those of St. Luke on the 10th and St. Simon and St. Jude on the 28th.

October Revolution, see under COMMUNISM; RUSSIA. *History*.

Octomeria, genus of small epiphytal orchids, bearing yellow, purple, and white, spotted with red, flowers. They are grown in moist fibrous peat and sphagnum in the warm greenhouse.

Octopus, name for large numbers of tetrabranchiate cephalopods, with eight arms and without the internal shell or 'bone' which is found in the mantle of many cephalopods. The body is oval or rounded, and the suckers are generally sessile. They are widely distributed on the shores of almost all temperate and tropical seas, and do not attain the great size of some of the decapod cuttles. The mature females are extraordinarily prolific, and may lay as many as 50,000 eggs in the course of a few days. The eggs resemble grains of rice in appearance, but are translucent and are attached to a common stalk in clusters of about 1000 each. They are fixed to a rock or stone, and, as Aristotle knew, the period of incubation is fifty days. The female watches over them with ceaseless attention the whole time. Os. spend the day-time lying hid in the shadow of rocks, but are more active at night. Their

powers of colour change have often been observed.

Octroi, term used with special reference to the system of duties imposed on different articles coming into different Fr. dists. or municipalities. In effect it is a kind of inland tariff. The system was abolished for a short time during the revolution, but shortly afterwards re-established, and it still flourishes. Farming-out has now for long been as strictly regulated as the scale of rates. By an Act of 1816 only such articles as are intended for local consumption are dutiable, with the exception of various necessities of life. The system is also in vogue in parts of Italy and the Iberian peninsula.

O'Curry, Eugene (known in Irish as **Eoghan O'Comhairde**) (1796-1862), Irish scholar, son of a farmer, b. at Dunaha, co. Clare. He was first employed in the topographical and historical section of the Irish Ordnance Survey, and in 1854 was appointed prof. of Irish hist. and archaeology at the Rom. Catholic Univ. of Ireland. His *Lectures on the Manuscript Material of Ancient Irish History* (1861) is one of the best accounts of Irish medieval literature. He trans. the anct. Brehon laws, the *Book of Lismore*, etc.; three vols. of his lectures entitled *On the Manners and Customs of the Ancient Irish*, ed. by W. K. Sullivan, were pub. in 1873.

Odal, see ALLODIUM.

Oddfellows. There is much in common between Oddfellowship and Freemasonry (*q.v.*), although the institution of the former is not above two centuries old. The registered offices of the largest friendly society order of O. in the world, the famous Manchester Unity Independent Order of O., are situated in Manchester. This society with the Grand United and sev. other orders of O., have long appropriated to themselves the once generic name of 'O.' The fundamental principle of Oddfellowship, according to its own laws, was the obligation to render assistance to every member who might apply for it in sickness, distress, or other misfortune. The Manchester Unity Independent Order of O. was estab. in 1810. Its objects are similar to those of most other societies (see FRIENDLY SOCIETIES). Any respectable person not under sixteen nor over fifty may be proposed for membership by a subscribing member. There are also juvenile and female lodges and members. The contributions are graduated according to the age of the member, and benefits are payable throughout life or until pension age, according to the insurance effected. The total membership (1948) was 900,000 and the funds £32,600,000. Management is by lodge and dist. meetings, officers and grand officers, and boards of directors.

Oddfellowship was introduced into the U.S.A. from the Manchester Unity in 1819; the Grand Lodge of Maryland and U.S.A. was formed in 1821. Connection was severed with the Manchester Unity in 1842, and the U.S.A. order rivals in influence the Manchester Unity, the two orders now having inter-fraternal arrangements. The first Canadian lodge was

opened as a branch of this in 1843 at Montreal, Canada. There are many lodges in Australia, New Zealand, South Africa, and other Brit. Dominions. The Amer. order has its headquarters at Baltimore and consists of a sovereign grand lodge and various grand lodges and subordinate lodges in the different states. Other organisations flourish in France, Switzerland, Denmark, Norway, and Sweden.

Ode (Gk. ὕμνος, a song), rhymed or rarely unrhymed lyric, usually exalted and stately in style, often in varied or irregular metre, and generally between fifty and two hundred lines in length. It originally meant any lyrical piece adapted to be sung and derives from the Gk. choir-song or choral-O. Pindar, the master of the O., developed it in a consciously elaborate form. Modern poets follow the lyrical O. of Sappho and Alcaeus. In the modern use of the word, Os. are distinguished from songs by not being necessarily in a form to be sung, and by embodying loftier conceptions and more intense emotions. The language of the O. is therefore concise and energetic, and the highest art of the poet is called into requisition in adapting the metres and cadences to the varying thoughts and emotions. Hence the changes of metre and versification that occur in many Os. Among the highest examples of the O. are the Song of Moses and sev. of the psalms. Dryden's *Alexander's Feast* is reckoned one of the first Os. in the Eng. language. Other examples are Gray's *Bard*, Collins's *Ode to the Passions*, Burns's *Scots wha hae*, Coleridge's *Dejection*, Shelley's *Ode to a Skylark*, and Wordsworth's *Intimations of Immortality from Recollections of Early Childhood*. The master of the Fr. O. may be said to be Ronsard (*q.v.*), who abandoned Pindar and imitated the poets of the Alexandrine school (a collection of whose works had just been pub. by Henri Etienne in the belief that they were those of Anacreon). Mention may also be made of Andre Marie de Chénier, whose best-known Os. are the Pindaric *Jeu de Paume* and an eloquent one addressed to Charlotte Corday; Victor Hugo, whose *Odes* (1822) won for him the protection of Chateaubriand and the favour of the king; and the *Odes Panambulesques* of Théodore de Banville (1857). Os. may vary from the 'florid and scrupulous' O. *To Mistress M. R. Comuel concerning her Choice* by Richard Crashaw, which is remarkable for its superlunary lack of sympathy, to the esoteric Os. of Gray, and from the O. on political themes, which attracted Coleridge, to one which is in effect an essay in the realm of mystical vision, such as may be found in the work of Patmore. Collins's *Ode on the Popular Superstitions of the Highlands* (1788) shows a taste as exquisite as that of Gray, and is important in the hist. of the early Romantic movement in Eng. literature and for its revival of imagination as an element in our poetry. He shows a truer sense of song in his Os. than does Gray, and perhaps they have best been described by Wordsworth, 'bright, solemn, and serene.' Gray's Os. are noted for their ornate

words, often chosen for the memory of their use by earlier writers. His *Pindaric Ods.* (not to be confused with the fustian *Pindarique Odes* (1656) of Abraham Cowley), which are framed in a metro which follows the strophe and anti-strophe of Pindar, have for their theme the hist. of England and of poetry, and are among the most perfect of his poems, though by no means the most popular. His *Progress of Poesy* has been called the forerunner of the Romantic movement, an honour which, however, he shares with Collins. Wordsworth's *Intimations of Immortality* is an epitome of his philosophy, in which he uses the Platonic concept of our pre-natal existence as a premise, a mystical intuition of a life which can be revived only for a few fleeting moments in the presence of nature. Shelley's *Ode to the West Wind* and *Skylark* are among the least characteristic of his poems, but are remarkable for their poetic ecstasy or fervour; more characteristic of his political views and passions is his *Ode to Liberty*, written in 1820. Keats's three great Ods., *To a Nightingale*, *On a Grecian Urn*, and *To Melancholy*, apart from their intrinsic beauty, are remarkable as revelations of the tender and pensive melancholy which was his characteristic view of life. All are written with great felicity of expression, and with a rare balance of direct narrative and suggestion, and all of them are illustrations of the theme that knowledge gained by imagination is truer than that derived from argument. Coventry Patmore's *To the Unknown Eros* is a series of Ods. which show some power of mystical vision, and have a subtle music of their own. Francis Thompson's Ods., like most of his poetry, are also full of mystical vision, but his art is less mature than that of Patmore though, in his own sphere, e.g. in *Orant Ode* and *From the Night of Foreboding: an Ode after Easter*, he is far more poetically rich even if mannered.

Odell, Jonathan (1737-1815), b. in New Jersey, was one of the Amer. loyalist colonists who made himself celebrated as a satirist whose verses were directed against those who led the war for independence. He studied at Princeton, entered the medical profession, and then became a minister with a par. at Burlington, New Jersey. After the outbreak of hostilities between the Amer. colonists and England, O. voiced the feelings of a large number who remained true to their allegiance to the Brit. Crown. In 1776 he wrote an ode in celebration of King George III.'s birthday, and had to escape to New York, where he became chaplain in the royal army. He continued to put his muse to the service of England, his best-known production being *The American Times* (1780). After independence was won by the colonists he remained unreconciled, and went to Nova Scotia, where he and his descendants took a part in the public life of that settlement.

Odell, Thomas (1691-1749), Eng. dramatist, b. in Buckinghamshire. He wrote political lampoons for Walpole, and estab. a theatre in London in 1729. In 1738 O. was deputy-licensor of the stage.

His plays are *The Chimera* (1721, anonymously); *The Patron* (1729); *The Smugglers* (1729); and *The Frodiguil* (1744).

Odessa, see ELSMIRA.

Odenburg, see SOPRON.

Odenaalsrust, tn. of the Orange Free State, S. Africa, 40 m. S.W. of Kroonstad. In April 1916 gold was found, the assay result of 23,047 in.-dwt. being the greatest ever recorded in S. Africa; Sir C. Oppenheimer described it as 'the most significant happening to S. Africa since the finding of diamonds in Kimberley and gold on the Witwatersrand.' (Nothing approaching this borehole assay had ever been recorded in gold-mining in S. Africa—Rand ore, for example, running at about 250 in.-dwt.) A dozen mines may be estab. in the dist. Regional development for the whole area is planned, including a large irrigation scheme. See S. D. Jacobson, *Free State and New Rand Gold*, 1910.

Odenkirchen, tn. of Rhineland, Germany, 21 m. S.W. of Düsseldorf, on the l. b. of the Niers. Pop. 1,000.

Odense, tn. and seaport of Denmark, and cap. of the is. of Funen, on the Odense R., 87 m. S.W. of Copenhagen. O. manufactures gloves, cloths, chemicals, and tobacco, and exports agric. and dairy produce. The tn. is a bishop's see. King Canute IV. and other kings are buried in the cathedral, and it was the bp. of Hans Christian Andersen. Pop. 76,000.

Odenwald, mountainous region of Hesse, Baden, and Bavaria in Germany, extending for 50 m. between the Neckar and the Main. It is well wooded, and many old castles crown its heights. The chief summits are Katzenbuckel (2057 ft.), Neunkircher Höhe (nearly 2000 ft.), and the Krähberg (1965 ft.).

Oder (Lat. *Viadua*), one of the prin. rivs. of Germany and Poland rises near Kozlau in Moravia, Czechoslovakia, and enters Silesia at Oderberg after a course of some 60 m. After traversing Brandenburg in a N.W. direction, it crosses Pomerania, and empties itself into the Stettiner Hafl. Length 500 m. Various tns. on the O. were involved in the Russian advance on Silesia and Brandenburg in 1915. Among those which saw the most desperate fighting were Glogau (Glogów), Breslau (Wrocław), Küstrin (Kostrzyn), Stettin (Szczecin), Oppeln (Opole). See *Southern and Eastern Fronts: Russo-German Campaigns in Second World War*.

Oderisius (d. 1105), lt. divine, was educated at Montecassino, where he became a Benedictine and after various eccles. offices, abbot. A poet, and a patron of scholars, he mediated between the crusaders and Alexius, the Gk. emperor.

Odosca'chi, Benedetto, see INNOCENT (popes), *Innocent XI*.

Odessa (Gk. *Odessus*), important city and seaport of the Ukrainian S.S.R., cap. of the region of the same name. One of the chief business centres of the Ukraine, and the prin. commercial port on the Black Sea, it has an excellent and spacious harbour, open to navigation all the year (O. Bay only freezes in hard winters), and lies between the Dnieper and the Dniester 32

m. N.E. of the mouth of the latter, near the Rumanian frontier. It is connected by railways with Leningrad, Moscow, Kharkov, the Ukrainian cap., Warsaw, Jassy, etc., and carries on steamer communication with other Black Sea ports, the Danube, Istanbul, and Marseilles. It has five harbours, the Quarantine, New, Pratique, Cabotage, and Petroleum, of which the four first are each protected by two breakwaters, and the last by one. Facilities include a repairing yard, a floating dock, two patent slips, and four floating cranes. In addition, recent land reclamation has provided greater dock accommodation. The chief export is grain; others are vegetable oils, wool, flax, sugar, hemp, cattle, pulp wood, and timber. Oil is imported from the Caucasus. The industries of the tn., which is well laid out, and contains handsome buildings despite the great damage it sustained when it changed hands during the revolution, include flour milling, oil-refining, metal-working, tanning, and the manuf. of jute, agric. machinery, and chemicals. There is cultivation of silk and the vine in the d. st. It has a custom house, and was made an open port by the Soviet Gov. to stimulate flagging trade. It is the seat of a univ., and the head quarters of the army of the S.

O. was first settled by the Gks., who formed a colony here. Uninhabited then for a long period, the region was possessed in turn by Lithuanians, Poles, and Tartars. The Turks here built a fortress in the eighteenth century, which was captured by the Russians, to whom the area was ceded in 1791. Two years later a Russian fortress was constructed, and immediately after the advantages to Russia of an ice-free port being realised, the tn. was constructed. During the Crimean war (1854) it was bombarded by the Brit. In 1905 it suffered from a naval mutiny and riots. The Turks bombarded it sev. times during the First World War, and it was captured by the Gers. in March 1918. In 1920 it fell to the Bolsheviks. The old residences of the bourgeois and noblesse situated on the outskirts and overlooking the sea in the residential dists. were converted into sanatoria and rest-houses. Here was the so-called Stalin bread-factory, one of the largest in Russia, devoted to baking a rather coarse type of brown bread. The machinery was part Eng. and part Russian. Pop. 601,000. See also EASTERN FRONT in THE SECOND WORLD WAR.

Odessos, see VARNA.

Odets, Clifford (b. 1906), Amer. playwright, b. at Philadelphia, of Lithuanian origin. After early career as an actor, he became associated with the Group Theatre in New York in 1930, and his first play *Axake and Sing* was produced by the group in 1935. In the same year he made his name with a one-act play, *Waiting for Lefty*, written for the New Theatre League. The play, based on the New York cab strike of 1934, was sensational for its social implications. Other plays include *Till the Day I Die* (1935); *Paradise Lost*

(1935); *Golden Boy* (1937); *Night Music* (1940); and *Clash by Night* (1941).

Odeum, or Odeon (Gk. ὀδεόν), among the ancients, the name for a public building devoted to performances of vocal and instrumental music. The O. was smaller than the dramatic theatre, and usually roofed in. The oldest known in Greece was the Skias at Sparta (c. 600 B.C.). The O. of Pericles on the S.E. slope of the Acropolis was completed about 455; that of Herodes Atticus or Regilla on the S.W. slope of the Acropolis was built about A.D. 160. Domitian built the first in Rome.

Odger, George (1820-1877), Eng. trade unionist, was a shoemaker. In 1862 he became secretary of the London trades union. He made five attempts, all unsuccessful, to enter Parliament. In 1861 O. organised the meeting which resulted in the formation of the Working Men's International Association, the president of which he became in 1870.

Odhreir, Norse mythology, the name of the cauldron containing the magic potion, the mead of poets, prepared by the dwarfs, Fjalar and Galar, from honey mingled with the blood of Kvasir, the wisest of men. The potion conferred wisdom, knowledge of runes and magic charms, and the poetic faculty on those who drank it.

Odo, St. (c. 962-1049), Fr. divine, was b. of a noble family of Mercur in the Auvergne. In 991 he became abbot of Cluny, and under his rule the Cluniac houses increased from thirty-seven to sixty-five. Known throughout Christendom for his liberality to the poor he was a friend of popes and princes, and the promoter of the feast of God, and instituted in 1031 the ann. commemoration of the faithful departed.

Odion-Barrot, s.v. BARROT, CAMILLE HYACINTHE ODION.

Odin, Woden, Wotan, or Wuotan, supreme god of Teutonic tribes, identified under Rom. influence with Mercury, whose day was Teutonic'd into 'Woden's Day' (Wednesday). O. is regarded as the source of wisdom and valour, and the patron of culture and heroes. In Norse mythology O. held a high place among the 'Aesir' or secondary gods. He was, in all probability, originally a storm-god, his name signifying 'mad' or 'the raging one,' and he is attended by two ravens and two wolves, and rides the horse Sleipnir. He was a god of war, the leader of hosts, giver of victory, in whose name the old tribes took possession of Britain, from whom both the royal houses of the rival kingdoms of Deira and Bernicia claimed descent, the great chief of Valhalla, and especially the god of those who were hanged, the gallows being known as his steed. Mimir, his uncle and keeper of the magic cauldron, Odhreir (q.v.), gave him to drink from the potion in it, but O., by a trick possessed himself of it. The first war of the world began by his hurling his spear, Gungnir, into the ranks of the Vaulr (gods of the atmosphere). O. could assume what form he chose from snake to eagle and, like certain gods in other mythologies, often visited earth in

disguise. O. was one of the three sons of Borr, the son of Borí, said to have been flicked out of the salt-ice-block by the cow Audhumla; his wife was Friggá and his son Balder.

Odo: 1. Of Beauvais, St. (801-880), gave up a military career to become a Benedictine at Corbie, becoming tutor to the sons of Charles Martel. He became bishop of Beauvais in 861, and his reforms had great influence on the whole church of N. France. He mediated between Hincmar of Rheims and Pope Nicholas I. **2. Of Cluny, St.** (c. 879-912), Fr. abbot, was b. in Maïue. In 909 he became a Benedictine at Baume, and in 927 became abbot of Cluny. Under his gov. the monastery began to exert its influence throughout France and in Italy. O. greatly enhanced the prestige of the Benedictine order. **3. The Good, St.,** Eng. bi-hop (d. 959), was b. in E. Anglia of Dan. parents. He became a bishop in Wessex, and was at the battle of Brunanburh (q.v.). He became archbishop of Canterbury in 912, was prominent in the legislative measures of King Edmund and Edgar, and prepared the way for the monastic restoration under SS. Dunstan, Oswald (O.'s nephew), and Æthelwold.

Odo: 1. Saxon archbishop of the tenth century, who is said to have abetted Dunstan in separating Queen Elgiva from Edwy. Having burned her face to mar her beauty, he banished her to Ireland. Later, when she returned, he had her mutilated and thrown into prison to die. **2. (c. 1036-97),** bishop of Bayeux, half-brother to William the Conqueror and co-regent of England with Wm. Fitzosbern during the king's absence in Normandy in 1067. After the revolt of Edwy and Morcar had been suppressed, when William placed Normans in the chief posts, Odo was assigned to O., who thenceforth was one of the leading barons; but, for conspiring against Wm. Rufus, he was expelled in 1088. **3. Of Cambrai** (1050-1113), Fr. bishop, was b. at Orleans. In about 1090 he founded a Benedictine community at Tournai; in 1105 he was made bishop of Cambrai, but refused to receive secular investiture, and died in exile. He was one of the most learned Fr. scholars of the eleventh century. **4. Of Cheriton** (d. 1217), Eng. preacher and fabulist, illustrated his sermons, completed in 1219, by excerpts from the bestiaires and older collections of fables. Some of these he issued separately as *Parables*. **5. Of Lagery, see** UKRAN (poises), *Urban* 11.

Odoacer, Odoacar, or Otokar (c. 435-493), was a Ger. captain of mercenaries and, in deposing Romulus Augustulus, a youth of seventeen, he estab. in 476 a Ger. kingdom on It. soil in place of the imperial gov. He took the title of king of Italy, and reigned till his power was overthrown by Theodoric, king of the Goths, A.D. 493.

O'Donnell, Leopold, Duke of Tetuan (c. 1809-67), Sp. general and statesman, b. at Santa Cruz, Tenerife, of Irish extraction, entered the army at an early age, fighting for the queen against the Carlists in the Civil war (1833). In 1840 he sided with the queen mother, Maria Christina,

and shared her exile in France. He became the enemy of Espartero, whom he drove from power in 1843, but two years later was appointed minister of war under Espartero, and in 1859, as Prime Minister, led an expedition against the Moors, for which he received his dukedom.

O'Donovan, John (1809-61), Irish historian and archaeologist, b. in co. Kilkenny, Ireland. He prepared a trans. of the Brehon laws, and was actively engaged on the Ordnance survey of Ireland. In 1832-36 he wrote a trans. of the *Annals of Ireland by the Four Masters*, pub. 1848-51. He also trans. and ed. for the Irish Archaeological Society *The Banquet of Dun nan Gaeh and the Battle of Moagh Rath* (1812). In 1815 he pub. a grammar of the Irish language.

Odontoglossum, genus of orchid, most of which can be successfully grown in a cool house, and which, on account of the beauty of their flow. and their general grace, are the most popular of hid genus. Most of them are natives of S. America. The flowers are borne on a long spike from 1 to 4 feet in number, and in a few species the spike are branched and bear a hundred or more flowers. The colours are chiefly brown, yellow, or white, and are often spotted.

Odontornithos (Gk. ὀδὼν, tooth, and ὄρνις, bird), name applied to a group of birds found only in the fossil state, which were characterised by having true teeth in their jaws. The extent of the term varies with different ornithologists, but it usually includes the important genera *Hesperornis* and *Ichthyornis*, both of which belong to the Cretaceous period.

Odoric (1286-1331), It. monk, b. at Pordenone or Portenau in the Friuli. He became a missionary, and travelled over the greater part of Asia. An account of his journey is contained in his *Life and Travels*, pub. after his death. See G. Venni, *Elogio storico alle gesta del Beato Odorico*, 1761.

Odour, Perception of, see NOSE.

Odoven, com. in the prov. of Drenthe, Netherlands, 9 m. S.W. of Assen. Pop. 10,000.

O'Dowd, Bernard (fl. 1903-12), Australian poet. His verse includes *Dawnward* (1903); *The Silent Land* (1906); *Dominions of the Boundary* (1907); and *The Bush* (1912).

O'Duffy, Eoin (1892-1944), Irish politician and soldier, b. in Monaghan, educated as an engineer. He played a leading part in the Sinn Féin movement, and was for a time chief of the Irish Republican Army, which he had joined in 1917; but on the signing of the treaty establishing the Irish Free State he broke away from de Valera, who, on coming to power in 1933, dismissed him from the post of chief commissioner of the civil guard to which he was appointed by de Valera's predecessor, Cosgrave. On a visit to Rome he met Mussolini, became an admirer of Fascist ideas, and formed a so-called National Guard, the Blackshirts, later renamed the National Corporative Guard, on semi-Fascist lines, the organisation being dissolved by de Valera as a subversive body.

In the Sp. civil War he led an Irish brigade to fight for Gen. Franco, but it returned after a few months. His book, *The Crusade in Spain*, appeared in 1938.

O'Dwyer, Sir Michael (1864-1940), Brit. administrator, educated at St. Stanislaus College, Tullamore, and Balliol College, Oxford. He entered the Indian civil service in 1885 and, in a long administrative career, held the posts of resident at Hyderabad (1905); agent to the governor-general for central India (1910), and governor of the Punjab (1913-19). His term of office in the last post coincided with a stormy period in the political life of the Punjab, and during the last year of his governorship the Amritsar incident occurred in which sev. hundreds of people were killed following an order given by Gen. Dyer to open fire on crowds which had congregated for political demonstrations (see AMRITSAR). One sequel was that the nationalist press demanded the impeachment of the governor of the prov., but O'D. was further employed as a member of the Escher Committee on Indian Army administration and organisation. He was a consistent opponent of the Indian constitutional reforms, holding that they would be disadvantageous to the Moslem pop. In his book, *India as I Knew It* (1925), he gave an account of the period during which he was governor of the Punjab, and defended his attitude at the time of the Amritsar incident. He was assassinated at the Caxton Hall, Westminster, by an Indian.

Odysseus, see ULYSSES.

Odyssey, see HOMER.

Oecumenical, or **Ecumenical** (through Lat. from Gk. *oikoumenikos*, universal, from the whole inhabited world), term applied to the decisions of the whole Christian Church as embodied in the general councils from that of Nicea onwards (see CONCILS). The Apostles' Creed, the Nicene Creed, and that commonly called the Creed of St. Athanasius are spoken of as Ec. symbols, being held throughout the whole church. The Rom. Catholic Church considers a council Ec. if summoned by the pope from the churches in communion with Rome.

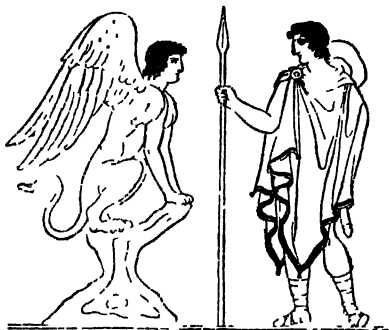
Æcumenius, bishop of Trikka in Thessaly, supposed to have flourished in the ninth or tenth century. To him are attributed sev. commentaries in Gk. on books of the N.T., on the Gospel, Acts of the Apostles, Pauline Epistles, and Catholic Epistles. His works were pub. at Paris in Gk. and Lat. in 1631.

Edema, see under DROPSY.

Edenburg, see SOPHON.

Edipus, Gk. mythology, was the son of Laius, king of Thebes, and of Jocasta. His father having been warned by an oracle that he would perish at the hands of his offspring, Ec. was exposed on Mt. Cithæron, whence he was rescued by a shepherd of King Polybus of Corinth. The child was brought up at Corinth as the king's son. When he had grown up he was told by the Delphic oracle not to return home as he must inevitably be the murderer of his father and the husband of his mother. He consequently fled from

Corinth, and on his way to Thebes slew Laius in a quarrel, being ignorant of the identity of his antagonist. Ec. then delivered the country from the Sphinx, and was rewarded with the hand of Jocasta, by whom he had Eteocles, Polynices, Antigone, and Ismene. As a punishment for this incest Thebes was devastated with a plague, and the oracle declared the country could only be delivered by the expulsion from it of the murderer of Laius. Ec. made careful inquiries, and discovered to his horror that he was the guilty man. Jocasta hanged herself, and Ec., having put out his eyes, left Thebes, led by his daughter Antigone, and died at Colonus, near Athens. His tragic fate was set forth by Euripides, Aeschylus, and Sophocles



ŒDIPUS AND THE SPHINX

From a vase painting

(see also trans. by Sir G. Murray, *Œdipus at Colonus*, 1918); in 1945 his *Œdipus Tyrannus* was performed in London in a trans. by W. B. Yeats called *Œdipus Rex*.

Œdipus Complex, see under PSYCHOANALYSIS.

O.E.E.C., see ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION.

Oehlschläger, Adam Gottlob (1779-1850), one of the leading Dan. romantic poets, b. in Copenhagen. The first of his tragedies was *Haakon Jarl* (1807), followed by *Correggio* (1809). His *Digte*, which appeared in 1803, marked the commencement of a new era in Dan. literature. Two years later he pub. two vols. of *Poetiske Skrifter* and then travelled on the Continent for four years. In 1810 he returned to his native place, and was appointed to the chair of aesthetics in the Copenhagen Univ. Other pubs. include *Helge* (1814); *Nordensqader* (1819); and *Dina* (1842); the most successful of the later tragedies. In 1830-31 he pub. his autobiography, and in 1850 his reminiscences. See lives by Arentzen, 1879, and Y. Nielsen, 1879.

Oelwein, banking city of Fayette co., Iowa, U.S.A., 14 m. N. of Independence. It has machine shops and agric. interests, and manufs. cloth, chemicals, and boots. Pop. 8500.

Cenone, in Gk. mythology, the daughter of the riv.-god Cebren and wife of Paris, son of Priam, king of Troy, who afterwards deserted her for Helen. Ovid, in *Heroides* v., gives a description of her grief on finding herself abandoned. See also Tennyson's *Cenone*.

Cenothera, genus of hardy annuals, biennials, and perennials (family Onagraceae), natives of America. *Ce. biennis* is the fragrant, yellow-flowered evening primrose which has so long been grown in gardens that it has become naturalised. Some other species are, like it, night-flowering, but many, notably *Ce. fruticosa*, bloom only in the day. 'Spats' or mutations of *Ce. lamarkiana* were studied by de Vries and used as the foundation for his theory of evolution by mutation. A number of species are now incorporated in the genus *Gutelia*.

Cerebro (Sweden), see ORKURO.

Cersted, Hans Christian (1777-1851), Dan. physicist, b. at Rudkøbing. He was appointed prof. of physics at Copenhagen in 1806. His greatest discovery was the result of experiments on the magnetic needle with the electric current, described in his *Experimenta circa Effectum Confluxus Aeth. et in Aem. Magnetuum*. The O., the unit of magnetic field strength, was named after him. He also pub. a *Manual of Mechanical Physics* and wrote numerous studies in chemistry, popular science (especially *The Soul in Nature*, 1856), metaphysics, etc. Most of his works have been trans. into Ger. See life by J. C. von Rauch and P. W. Forchhammer, 1853.

Oesel, or **Saaremaa**, is. in the Baltic, at the entrance of the gulf of Riga, belonging to the Estonian S.S.R. It is 45 m. long, and covers an area of 1000 sq. m. The coasts in the N. and S. are very bold and steep. Arensburg, on the S.E. coast, is the only tn. of importance. O. is noted for its small breed of hardy ponies, similar to those of Shetland. The coast fisheries, especially of seals, are important. In 1939 it became a Russian military base, by a pact of assistance. Pop. 31,500.

Cesophagus, see GULLET.

Estridae, family of dipterous insects, consisting of large hairy flies with very short antennae enclosed in a cavity in the fore part of the head, with rudimentary mouth-parts. The larvae are nearly all parasitic on mammals, and the perfect insects are well known as the obnoxious bot-flies. The larvae of *Estrus oris* infest sheep; those of *Gastrophilus equi* pupate in horses; while the larvae of *Hypoderma lineata* and *H. bovis* are found in cattle.

Oestrous Cycle and **Oestrogens**. The O. C. is the reproductive cycle of female animals, especially mammals. On one or more occasions during the breeding season the female is receptive to the male and is said to be 'on heat'; this is the period of *oestrus* and is accompanied by ovulation, i.e. the discharge of an egg from the ovary. *Oestrus* is preceded by a period known as *pro-oestrus*, when the vagina swells and becomes increasingly vascular, in preparation for coition, and it is followed by the period of *post-oestrus*, when the uterus

hypertrophies ready to receive the egg if fertilisation has occurred, so that post-oestrus then merges into pregnancy. If fertilisation has not taken place, *oestrus* is succeeded by the resting period of *anestrus*, preparatory to a repetition of the whole O. C. The menstrual cycle of women corresponds to the O. C. of other mammals, but it is distinguished particularly by the bleeding of menstruation which is absent or inconspicuous in other species.

The changes occurring in the O. C. are brought about by a hormone or *oestrogen* produced in the ovary, and responsible also for the development of the secondary sexual characters (as for instance the breasts) at puberty. The *oestrogen* produced by the ovary is *oestrin* (or *oestron*) with the formula $C_{18}H_{16}O_2$, but other similar synthetic compounds such as stilboestrol have now been prepared and are useful in medicine, e.g. for treating the disorders of the menopause when there is a deficiency of natural oestrogen.

O'Faolain, Sean (b. 1900), Irish author, b. in Dublin; educated at the National Univ., Dublin, and Harvard Univ., becoming commonwealth fellow in U.S.A., 1926-28. He remained lecturing in Amer. univs. until 1933, when he returned to Ireland to devote himself to writing. His first vol. of stories, *Midsummer Night Madness*, was pub. in 1932, followed by the successful novel, *A Nest of Simple Folk*, in 1933. In addition to these and other stories of Irish life, he is known for his biographies of Irish revolutionary figures: Constance Markievicz (1931), Daniel O'Connell (*King of the Baggars*, 1938), and De Valera (1939).

Offa, Mercian king of the eighth century. He succeeded Ethelbald in 755, and, having slain Lichelbert, king of the E. Angles, took possession of his kingdom. To atone for his crime he gave tithes to the church, made a journey to Rome, instructed the tax called Peter's Pence, and built the monastery at St. Albans. He became overlord of all England save Northumbria. The foundation of a third Eng. archbishopric, at Lichfield, was due to O. See also OFFA'S DYKE.

Offaly, or **King's County**, inland co., prov. of Leinster, Ire. It is bounded on the W. by the R. Shannon. The surface on the whole is flat, the N. part being occupied by the Bog of Allen, but the Slieve Bloom Mts. lie along the border between King's Co. and Queen's Co., the greatest altitude being 1732 ft. The soil is not very fertile, being either deep bog or gravelly loam, but there are some rich pastures near the Slieve Bloom Mts., and grazing dists. on the borders of Westmeath, which are chiefly used for sheep. Oats, barley, rye, potatoes, and turnips are grown, and cattle, sheep, pigs, and poultry bred. The chief tns. are Tullamore (co. tu., pop. 5900) and Parsonstown or Birr. The co. has an area of 771 sq. m. and a pop. of 52,000.

Offally, see KING'S COUNTY.

Offa's Dyke, great earthwork made about A.D. 785 between Dec and Severn by King Offa of Mercia as a boundary

between the Eng. and the Welsh. It is laid out and constructed with exceptional engineering skill to take every advantage of natural features of the land. It consists of a large rampart and a ditch, the latter normally on the Welsh side.

Offenbach, Jacques (real name **Jakob Levy Eberst**) (1819-80), Ger.-Fr. composer, b. at Offenbach-on-Main. His father was cantor at the synagogue of Cologne, but he was sent to Paris early in his youth, studying at the Conservatoire in 1833-37, perfecting himself in cello playing and then playing in the orchestra of the Opéra-Comique even before he left the Conservatoire. In 1849 he became conductor at the Théâtre Français. In 1853 he produced his first operetta, *Pe-pi-to*, and during a quarter of a century he turned out nearly 100 light stage pieces. In 1855 he took over the management of the Théâtre Comte and renamed it the Bouffes-Parisiens. This lasted until 1861, whereafter he had no theatre of his own until 1873, when he managed the Théâtre de la Gaîté until 1875. In 1876-77 he was in U.S.A., but returned to Paris, where alone he found that his success was permanent. His only large-scale opera, *Les Contes d'Hoffmann*, occupied him for many years, but he left it not quite finished at his death, and it was revised and partly scored by Giraud. He has been styled the creator of opera bouffe. His works include *La-tu-clan* (1856); *Orphée aux enfers* (1858, revised 1871); *Genevieve de Brabant* (1859, revised 1875); *Chanson de Fortunio* (1861); *La Belle Hélène* (1865); eighty-nine operettas including *Barbe bleue* (1866); *La vie Parisienne* (1866); *La Grande Duchesse de Gérolstein* (1867); *Robinson Crusoe* (after Defoe) (1867); *La Périochole* (1868); *L'île de Tulipatan* (1868); *Princesse de Trébizonde* (1869); *L'eri-eri* (1869); *La jolie Parfumeuse* (1873); *Voyage dans la lune* (after Verne) (1875); *Whittington and his Cat* (1875); *Le Docteur Oz* (after Verne) (1877); *La Foire de Saint-Laurent* (1877); *Madame Facret* (1878); *La Fille du lamboir-major* (1879); *Les Contes de Hoffmann* (1881); and ballet *La Papillon* (1860). Another opera, *The Goldsmith of Toledo* (after Hoffmann) (produced in 1919) is a pastiche from sev. operettas, especially *Le Corsaire noir*.

Offenbach, tn. of Hesse, Germany, on the l. b. of the Main, 5 m. S.E. of Frankfurt. The manufs. include aniline dyes, carpets, machinery, fancy leather goods, etc. The tn. owes its prosperity to the settlement of Huguenot refugees in the seventeenth century. Pop. 81,100.

Offenburg, tn. of Baden, Germany, 26 m. from Baden. It is a railway junction, and manufs. glass, textiles, and cigars. Pop. 18,000.

Offensive Trades. This expression as used in the Public Health Act, 1875, denotes certain specified trades, namely, those of a blood boiler, bone boiler, fellmonger, soap boiler, tallow melter, or tripe boiler, and also any other noxious or offensive trade, business, or manuf. In dists. to which Section 51 of the Act applies O. T. will include any trade, busi-

ness, or manuf. which the local authority declares by order confirmed by the ministry to be an offensive trade. To estab. (see below) an offensive trade in an urb. dist. without the written consent of the dist. council renders the offender liable to a penalty of £50, and a daily penalty is incurred by those who continue without such consent to carry on an offensive trade estab. since 1875. Estab., in this context, was the subject of legislation in 1925. The Public Health Act of that year made special provision to meet the case of trades estab. after being declared O. T. With the object of abating nuisances from O. T., the Public Health Act, 1875, provides that if the medical officer of health or any ten inhab. of a dist. or two legally qualified medical practitioners certify to the urb. dist. council that any melting-place, soap-house, slaughter-house, etc., is a nuisance, and dangerous to the health of the inhab., the council must proceed summarily against the owner or occupier (or even the foreman or other employee) for penalties; which penalties, on subsequent conviction, may be increased to £200. An action may also be brought in the high court for nuisance (*q.v.*). Local authorities also have statutory powers for regulating alkali and chemical works.

Offertory (Lat. *offertorium*, a place of offering; an oblation), in the Rom. Catholic Church, that part of the mass in which the unconsecrated bread and wine are offered to God; the name is also given to the prayers and antiphon which accompany the offering. In the Church of England the name is applied to the O. sentences appointed to be read by the minister after the creed or sermon at the communion, while the alms of the people are being collected. In recent times the name has been transferred to the alms themselves. See under COLLECTIONS AT CHURCHES.

Office, Holy, or more completely the Congregation of the Holy Office of the Inquisition, forms a dept. of the Rom. curia for the examination of books and the trial of eccles. offences. See INQUISITION.

Office Management, art of organising the clerical work entailed in commercial undertakings, gov. depts., local authorities, and other organisations large and small. The office manager fills a position calling for great skill and variety of talent in that he must arrange for the work to be performed in the best way possible in the circumstances, and obtain the optimum output from his staff. From this it follows that he must give careful consideration to personnel, working conditions, office appliances, clerical routines and forms, and incentives, as well as to both departmental relations and the function of each individual. The office manager must first and foremost consider his personnel in order to produce an efficient and happy staff who will do the work well. Careful selection is necessary for each job, fair salary rates should be fixed, known opportunities for promotion should be open to all, and good working and welfare conditions are of first importance. From the point of view of the work to be

carried out the manager must devise suitable routines and systems which will enable it to be dealt with in the most speedy and efficient manner. Office work usually consists of gathering, collating, and recording data, mainly of a financial and statistical nature, but also comprising information of other kinds. Correspondence both with other organisations and the public and also with other depts. of the organisation must be dealt with, either as part of a routine or, if its importance requires, with individual attention. Outgoing mail must be prepared, sorted, and distributed. In order to deal with all the work efficiently the office manager should have a good knowledge of office and accounting machinery, of which the most important are the typewriter, duplicator, addressing machine; also the various accounting machines, such as posting, adding, and calculating machines (*q.v.*), and the large sorting and tabulating machines. It is the function of the O. M. to co-ordinate work, staff, and machinery into an organisation which operates smoothly and performs the work required of it as efficiently as possible. From this it will be apparent that the principle of div. of labour is resorted to in the modern office. Clerical routines are broken down into their component parts, and repetitive operations are grouped together. A girl employed, for example, on typing only will have a greater output than another employed on a variety of duties. Another problem is that of authority. The office manager should establish a definite chain of responsibility from himself downwards, so that each individual knows both the nature of his duties and to whom he is responsible. As far as feasible the office should be organised according to functions rather than in depts., though in practice it may not be possible to carry this out entirely. The above brief outline will give an idea of the scope and intricacy of O. M. Its importance may be gauged from the fact that His Majesty's Treasury has set up an organisation and methods dept. to investigate, improve, and simplify the office work of all the depts. of the Brit. civil service. See C. C. Parsons, *Office Organisation and Management*, 1917; L. Galloway, *Office Management: its Principles and Practice*, 1918; W. Campbell, *Office Practice*, 1932, 1918; L. Dicksee and Sir H. Blain, *Office Organisation*, 1917; and H. W. Simpson, *Modern Office Management*, 1918.

Officer. This term when it stands alone is always held to refer to an O. holding the king's commission. The active army list contains the names of all Os. currently serving. But the status of O. holds good even after retirement from the active list. Os. whilst on full pay are forbidden to hold any municipal office, exempted from jury service, either coroner's, grand, or common juries, and may not become directors of any company. Special permission must be granted before an O. on the active list can leave the country. Although any O. can be dismissed at His

Majesty's pleasure, nevertheless it is only after trial by a general court martial that an O. can be punished. The term field O. includes colonels, lieutenant-colonels, and majors, Captains, lieutenants, and second lieutenants are called company Os. See also ARMY, *Army Pay*; RANK; SERGEANT; WARRANT OFFICER.

The *Officers' Training Corps* was an organisation among the univs. (senior branch) and schools (junior branch) whereby students received training in military drill, weapon training, signalling, map-reading, elementary tactics. Its purpose was to supply Os. by direct commission to the Territorial Army, Territorial Army Reserve of Officers, and Reserve of Officers. The O.T.C. is now replaced by the senior and junior training corps, whose aim is to supply a groundwork of military education, and thus shorten the time spent in elementary training during military service.

Officers' Mess. see *under* MESS.

Officers' Training Corps. see TRAINING CORPS.

Official List. see STOCK EXCHANGE.

Official Receiver, or Liquidator. see *under* BANKRUPTCY; COMPANY; and COMPANY LAW.

Official Secrets. The Official Secrets Act, 1911 (which repeals and re-enacts with amendments the Act of 1889), makes it a felony punishable with penal servitude to approach or enter any 'prohibited place' for any purpose prejudicial to the safety or interests of the State; to make any sketch, plan, model, or note calculated to be useful to an enemy; or to obtain or communicate to any other person any information which might be or which is intended to be useful to an enemy. It is not necessary to show that the offender was guilty of any particular act tending to show a purpose prejudicial to the State, and he may be convicted if, from his conduct or known character, it appears that his purpose was prejudicial to State interests. The Act also provides that any person who communicates to any unauthorised person information that has been entrusted to him in confidence by any person holding office under the Crown is guilty of a misdemeanour. The repealed Act of 1889 was passed after a Foreign Office official had disclosed a confidential diplomatic document. The law was strengthened in 1911, following a proposal by the Committee of Imperial Defence. The law was further strengthened by an Act of 1920 which makes it a misdemeanour to do certain things, either in order to gain admission into a prohibited place or for any purpose prejudicial to the safety or interests of the State. These acts include the unauthorised use of a naval, military, air force, or police uniform or one which resembles an official uniform; forging or tampering with passports or military or naval passes or permits; personating some office-holder or person to whom an official code or pass has been issued, or being in unlawful possession of any die, seal, or stamp belonging to a gov. dept., or a die, etc., so resembling an official die as to be

calculated to deceive; or retaining an official document without authority to retain it; or allowing any other person to have possession of an official document issued for the use of the accused alone; or communicating a secret official code word or password; or being in unlawful possession of any such code or password. The fact that a person has been in communication with or attempted to communicate with a foreign agent, whether in Great Britain or abroad, is evidence that he has, to the prejudice of the safety and interests of the State, obtained or tried to obtain information which is calculated or intended to be useful to an enemy, and this evidence may be adduced in proceedings under Section i. (Spying) of the prin. Act (1911). The secretary of state has power to compel, by warrant, the production of telegrams from any person who owns or controls any telegraphic cable or wireless business, when it is expedient in the public interest to compel production; and any person who carries on the business of receiving postal packets must be registered and is subject to regulations which require him to keep books giving the names and addresses of persons for whom packets are received and any instructions received as to the delivery. The Act also gives to chief officers and superintendents of police and others somewhat exceptional powers of interrogation in cases under the Act.

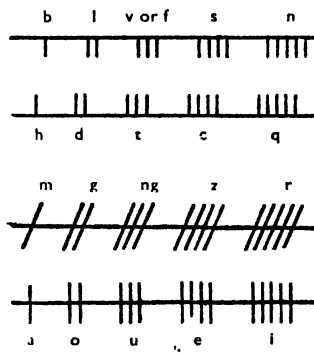
Offset printing, see under LITHOGRAPHY.
O'Flaherty, Liam (b. 1897). Irish author. b. in the Arran Is., co. Galway; educated at the National Univ., Dublin. He served with the Irish Guards during the First World War; after being invalided out he took part in the Irish revolution of 1917. After the war he entered the merchant service and travelled widely. His first novel, *Thy Neighbour's Wife*, was pub. in 1924, followed by *The Black Soul* in 1925 and a vol. of short stories, *Spring Sowing*, in 1926. With *The Informer* and *Mr. Gilhooley*, novels of Dublin low life, both pub. in 1926, he estab. his reputation as a powerful realistic writer, but the romantic side of his nature found expression in his idyllic short stories, many of which were descriptive of life in the Arran Is., where he was b. Other novels include *The Martyr* (1927); *The Assassin* (1928); *The House of Gold* (1929); *The Puritan* (1932); *Hollywood Cemetery* (1933); *Famine* (1937, a novel of the potato famine of 1846); and *Land* (1946, an adventure of the Fenian rebels). *Two Years* (1930), *I Went to Russia* (1931), and *Shame the Devil* (1934) are autobiographical books.

Offertingen, Heinrich von (c. 1170-1250), famous minnesinger (q.v.).

Ogam, or Ogham. This term, spelt in Old Irish *Ogam* or *Ogum*, of uncertain origin and meaning, has been applied to a peculiar form of cryptic language, and more especially to a curious script, employed by the anct. Goidelic Celtic pop. of the Brit. Isles. Of the nearly 400 inscriptions still preserved, over 260 were found in the S. co. of Ireland (mainly in Kerry and Cork), fifty-five in the rest of Ireland, about forty in Wales, one in

Cornwall, two in Devon, one in Hampshire (at Silchester, marking the E. limit of their distribution), about ten on the Isle of Man, and about twenty-five in Scotland. There are sev. stones with O. inscriptions in the National Museum, Dublin, and in the Brit. Museum, of which that from Llywel, Brecon, bearing the name 'Macutrenas' is the best-known. The great majority of these inscriptions belong to the sixth century A.D., but some belong to the fifth and some to the seventh century. The inscriptions found in Ireland are, with one exception, written in O. alone (in Celtic) while the inscriptions found in Wales are usually bilingual (Lat.-Celtic) and written in Rom. characters and O. script. A Runic-O. inscription was found on the Isle of Man. The inscriptions found in N.E. Scotland and in the N. Isles, chiefly on the Shetlands, are written in a variety known as 'Pictish Oghams'; they are assigned to the anct. Picts, who according to some scholars spoke a non-Celtic and non-Indo-European language.

The O. inscriptions contain very little besides proper names, but these are of great value for the light they throw upon the early Celtic tongue. Indeed, in orthography and the inflection of nouns, these inscriptions reveal a stage of the Celtic idiom much earlier than that of the earliest preserved MS. literature, which, partly belonging to the sixth century A.D., is contemporary with them. The O., for instance, still makes use of letters *q*, *e*, *ng*, unknown to the MSS.; the anct. inscriptions supply us with *magri*, the genitive of the word which has yielded the word *mae*, 'son.' The direction of writing was either vertical (\perp wards) or horizontal.



THE OGAM CHARACTERS

The peculiar O. alphabet consisted of twenty letters, divided into four groups or *acemes*, and represented by strokes, from one to five in number, arranged in various positions about a central stem-line. The place of this chief line was sometimes filled by the edge or arisal of the object (usually stone or other squared hard

material), on which the letters were cut. The letters of the first *alcme* (*b, l, r* or *f, s, n*) were placed under the line (assuming this to be horizontal); the second *alcme* (*h, d, t, c, q*) above it; the third *alcme* (*g, n, z, r*), diagonally through it; and the fourth *alcme* (*a, o, u, e, i*) intersecting it at right angles, or by notches. There were five other characters *forfeda*, which were a little more complicated. They are generally interpreted as diphthongs (*ea* or *eo*, *oi*, *ia* or *io*, *ui*, and *ae*), which according to some scholars have often a consonantal value in the inscriptions (a kind of guttural *k, p, x*, etc.).

This alphabet was the basic O. script. There were sev. secondary varieties, such as the 'bird O.' (*En-O.*), 'herb O.' (*Lus-O.*), 'colour O.' (*Dath-O.*), 'church O.' (*Cult-O.*), 'pig O.' (*Muc-O.*), 'son O.' (*Moc-O.*), and many others.

The use of the cryptic O. script continued until the Middle Ages, and the late fourteenth-century *Book of Balthamoth* (ed. by R. Atkinson, 1887; see also Calder, ed., *Auratioplus u. Fies, the Scholars' Primer*, 1917) reproduces the earliest keys for transliteration. See J. R. S. *Lectures on Welsh Philology*, 1879; J. MacNeill, 'The Irish Ogham Inscriptions', *Proceedings of the Royal Irish Academy*, 1909; R. A. S. Macalister, *The Secret Languages of Ireland*, 1937; J. Vendryes, 'L'Écriture oghamique et ses origines', *Revue Celtique*, 1941; D. Bringer, *The Uppabot*, 1949.

Ogasawara Jima, see BONIN ISLANDS.

Ogden, Charles Kay, *b.* 1889, Eng. linguist; educated at Cambridge, director of the Orthological Institute. In 1926, with I. A. Richards of Harvard, he began research on Basic English (*g.e.*), on which he has pub. sev. works. Other pub. include: with I. A. Richards and J. Wood, *The Foundations of F-English* (1922); *Baltham's Theory of F-English* (1922); with I. A. Richards, *The Meaning of Meaning* (1941); *The ABC of Psychology* (1944).

Ogden, city of Utah, U.S.A., and co. seat of Weber co., on the Weber, 35 m. N. of Salt Lake City. Pop. 15,000.

Ogdensburg, city and riv. port of New York, U.S.A., in St. Lawrence co., on the St. Lawrence R. Pop. 16,000.

Ogee, moulding formed by two curves, the upper convex and the lower concave, called also the *ogive reverse*. In Fr. the ribs which in Gothic vaulting cross the vault diagonally are known as *ogives*, and the adjective is also frequently applied to arches in a way that makes it practically synonymous with Gothic.

Ogerius, Oggore, or Oggieri, see OGGERIO DI DANOS.

Oggione, Oggionno, or Uggione, Marco da (c. 1470-1540), It. painter, *b.* near Milan. He studied under Leonardo da Vinci, and made sev. copies of his 'The Last Supper,' one of which is in the Royal Academy. He also executed frescoes for the church of S. Maria della Pace at Milan, the two best being 'The Marriage at Cana' and 'The Assumption,' both of which are now in the Brera.

Ogier le Danois (It. *Uggero, Oggero, Oggieri*; Lat. *Ogerius*), hero of an anct. Fr.

romance whose story is probably a contribution from the store of Norman tradition, Hoiger, or Olger, Danske being the national hero of Denmark. He figures in Ariosto's *Orlando Furioso* and other romantic tales and poems. According to some authorities, his surname was bestowed on him because he came from Denmark. Others say that he took it after having conquered that country; while yet others say that O. was a Saracen who turned Christian, and as they wrote to him from home *tu es danois*, for having changed his religion, the Fr. barons called him in jest O. *Danois* and he himself insisted on being so called when he was christened. This surname agrees with the assertion that he was conquered by Charlemagne. Rightly advanced the opinion that O. is the Heli of the Edda, and in this view Panzer concurs. He is also identified with the Frankish warrior, Ottokar (or Autkar). See also C. Voretzsch, *Über die Sage von Ogier dem Danois*, 1891; P. Paris, *Recherches sur Ogier le Danois*, Bibliothèque de l'École des Chartes.

Ogilby (incorrectly Ogilvy), John (1600-1676), Scottish miscellaneous writer, *b.* near Edinburgh. He accompanied Stratford to Ireland and was made deputy-master of the revids, but his fortunes being ruined by the Civil war, he returned to England. Having learned Lat. he trans. Virgil into Eng. verse (1649-50), and being successful in this attempt turned to Gk., and pub. his *Iliad* in 1660. He was entrusted with the 'poetical part' of the coronation of Charles II. in 1661.

Ogilvie, Sir Frederick Wolff (1893-1949), Eng. scholar and administrator, *b.* at Valparaiso. Educated at Balliol College, Oxford, from 1920 to 1926 he was a fellow and lecturer at Trinity College. Until 1934 he was prof. of political economy at Edinburgh Univ., when he became president and vice-chancellor of Queen's Univ., Belfast. In addition to membership of sev. councils and committees O. was director-general of the R.B.C. from 1935 to 1942, his term of office being marked by the inception of the forces programme and the expansion of the overseas service. Knighted in 1942, he joined the Brit. Council, and in 1944 became principal of Jesus College, Oxford.

Ogilvie, John (1797-1867), Scottish lexicographer, *b.* in Banffshire. In 1824 he entered Aberdeen Univ. and in 1831 was appointed mathematical master in Gordon's Hospital. He compiled the *Imperial Dictionary* (1850, supplement, 1855); *Comprehensive English Dictionary* (1863); and the *Students' English Dictionary* (1865).

Oglethorpe, James Edward (1696-1785), Eng. general and philanthropist, the founder of the state of Georgia, was *b.* in London. He served under Prince Eugene, and distinguished himself in the campaign against the Turks, 1716-17. In 1722 he became M.P. for Haslemere, and in 1729 was chairman of the parl. committee on debtors' prisons. In 1732 he obtained a charter for settling the colony of Georgia in America as a refuge for paupers and a

barrier for Brit. colonies against Sp. aggression. He met with some opposition, however, in the administration of his colony, especially by his prohibition of Negro slavery and rum, and he also had difficulties with the Wesleys and Whitefield. But a noteworthy fact is that he defended his colony against the Spaniards by allying himself with the Indians. He wrote *A New and accurate account of the provinces of South Carolina, Georgia, etc.* (1733), and *An Important account of the late expedition against St. Augustine* (1712). Returning to England in 1743, he took part against the Jacobite insurrection of 1745 and was accused of misconduct, and although acquitted his life as a soldier was at an end, and he did not return to Georgia. He was a friend of Dr. Johnson, Boswell, Goldsmith, Burke, and Walpole, and Pope has immortalised his name in the couplet:

'One, driven by strong benevolence of soul,
Shall fly like Oglethorpe from pole to pole.'

Ogmore and Garw, urb. dist. and tn. of S. Wales, in Glamorgan-shire, 4 m. S.W. of Bridgend. Coal is extensively mined. Pop. of dist. 22,700.

Ogowé, Ogowai, or Ogoway, riv. of W. Africa, in Fr. Equatorial Africa, rising in lat. 3° S., a little to the S. of Ngauzo. Its direction is N. to W., and then S.W., receiving sev. tribs. on both sides, including the Lolo and the Ivindo. It enters the Atlantic by a delta after a course of 750 m.

O'Grady, Standish James (1816-1928), Irish historian and novelist; b. at Castle-town Berhaven, where his father was Protestant rector. Educated at Tipperary Grammar School and Trinity College, Dublin, where he graduated in 1868. He was called to the bar, but soon gave up the law. He pub. *History of Ireland* (1878-1880). Among his books of historical romance are *The Dog of Stars* (1893); *In the Wake of King James* (1896); *The Flight of the Eagle* (1897); *In the Gates of the North* (1901, 1921); and *Finn and his Companions* (1921). He also ed. Sir Thomas Stafford's *Poems of Ireland* (1896). He owned and ed. *Kilkenny Moderator* and *All-Ireland Review*.

Ogulín, tn. of Croatia, Yugoslavia, 60 m. S.W. of Zagreb. Pop. 9000.

Ogyges, or **Ogygus** (*Ogygys*), son of Bœotus and one of the Bœotian aborigines. He was king of the Hecenes, the oldest inhab. of Bœotia, which was visited during his reign by an inundation of Lake Copais. This flood is usually called after him the Ogygian.

O'Higgins, Bernardo (1778-1842) Chilean patriot, soldier, and statesman, generally known as the Liberator of Chile, natural son of Ambrosio O'H., also an administrator and soldier, of Irish birth. He led the Chilean patriot forces against the Sp. royalists (1810), and was made commander of the patriot army (1813) in succession to Juan José Carrera, who had been made general-in-chief in 1811. Carrera's republican troops twice defeated

Gen. Parola's forces, but were themselves defeated in 1813. The following year O'H., with Carrera, was also defeated, at Rancagua, and both leaders fled the country. They received the support of the Buenos Aires, levied an army in La Plata, and marched against the royalists, whom they completely defeated at Chacabuco (1817), and O'H. became dictator of Chile. The republicans were, however, severely defeated at Cancharayda, but this defeat was soon followed by the final defeat of the Spaniards at Maipo, the victory which sealed the independence of Chile. O'H.'s progressive administration after a few years was ended by a popular revolt in 1823, and he retired to Peru.

O'Higgins, Kevin Christopher (1892-1927), Irish politician, was b. at Stradbally, the son of Dr. T. Higgins, assassinated in 1923. Educated at Clongowes, St. Patrick's College, Carlow, and the National Univ. of Ireland, he was articled to his uncle, Maurice Healy, a solicitor, but did not serve out his time. He joined Sinn Féin, and took part in the Easter rebellion of 1916; whilst in prison as a result, he was elected M.P. for Queen's Co. He became minister of justice and vice-president of the executive council in Cosgrave's Gov. of 1922, establishing the civil guard and combating rebels by executions. In June 1927 O'H. was made minister for external affairs also, but in July was murdered near Bookerstown on his way to mass. See life by T. de Vere White.

O'Higgins, prov. of central Chile, takes its name from Bernardo O'H. (*q.v.*). Colchagua lies to the S. and Santiago to the N. The Andes traverse the E. portion. Gold is mined, cattle reared, and wine, fruit, and wheat produced. Rancagua is the cap. Area 2745 sq. m. Pop. 200,300.

Ohio: 1. One of the United States of America, known as the Buckeye State, bounded N. by Michigan and Lake Erie; E. by Pennsylvania and W. Virginia, from which it is separated by the Ohio R., which also forms its S. boundary, separating it from W. Virginia and Kentucky; and W. by Indiana. The Ohio R. forms its boundary for 436 m., and its lake shore is 240 m. O. has no considerable elevations, being highest in the centre and sloping thence to the lake in the N. and to the Ohio R. in the S. It is drained by numerous rivs., among which are the Great and Little Miami, Scioto, and Muskingum, affluents of the O.; and the Maumee, Sandusky, Huron, Vermilion, Cuyahoga, and Ashtabula, which empty into Lake Erie. The coal-beds of E. O. are of great extent, with abundant deposits of iron ore. This has led to enormous expansion of iron and steel industries, and, as a consequence, the building of great machine-making plants and automobile factories. The state ranks second in iron and steel products. Over 10,000,000 tons of pig iron are produced annually. Cleveland, and the neighbouring cities of Canton, Youngstown, Middletown, and Steubenville, are the great steel and iron centres. Akron manufactures automobile tyres and other rubber products. The output of automobiles in

Toledo and Cleveland is second only to that of Duluth. Petroleum and natural gas, sandstone, and limestone are produced. Clay, silica, cement, and salt are also produced, as well as bricks, tiles, clothing, furniture, spirits, and woollen and cotton goods. The soil is rich everywhere; the climate is temperate, with a liability to a cold in winter reaching sometimes below zero. The forests, which still cover large portions of the state, are rich in oak, black walnut, maple, etc. Horse-rearing, cattle-breeding, and dairy farming are important industries. The chief agric. productions are Indian corn or maize (138,000,000 bushels in 1917), rye, oats (19,000,000 bushels), hay, winter wheat, sorghum, tobacco, hemp, peaches, apples, grapes, cattle, sheep, and swine. The wool-clip in 1917 yielded 9,000,000 lb. A large commerce is carried on by the O. R., the lakes, two canals which connect Lake Erie and the O. In 1918 there were 325 airports and landing fields. Railway mileage is nearly 9000. The state is organised in eighty-eight cos. The legislature consists of a House of Representatives of 135 members and a Senate of thirty-three members, both Houses being elected for two years. Two senators and twenty-three representatives are sent to Congress. The chief towns are Cleveland, 867,300; Cincinnati, 458,000; Columbus (cap.), 323,000; Toledo, 278,200; Akron, 239,700; Dayton, 215,600; Youngstown, 167,700; Canton, 110,100; Springfield, 71,700; Lakewood, 68,500; Cleveland Heights, 57,000; Hamilton, 19,900; 12.5 per cent. of O.'s pop. are foreign-born, and there are great numbers of Ger. ancestry. Among the institutions of higher learning are O. State Univ. at Columbus with 28,000 students; W. Reserve Univ. at Cleveland, 9000; Cincinnati Univ., 7700. O. has superseded Virginia as the mother of presidents. Five men born in O. were elected as presidents while still O. men. Two others, elected as presidents of the state, were born in O. The prehistoric mound-builders left many remains in O., the most impressive being Serpent Mound, 1300 ft. long, in Adams co. O. was first settled in 1788 and organised and admitted as a state in 1803. Area 11,222 sq. m. Pop. 7,788,000. *See* J. W. Taylor, *History of State of Ohio*, 1841; W. D. Howells, *Recollections of Life in Ohio*, 1888; R. G. Randall and W. J. Ryan, *History of Ohio* (5 vols.), 1912; E. H. Roseboom, *A History of Ohio*, 1931; Federal Writers' Project, *The Ohio Guide*, 1940; and F. C. Wittke (ed.), *History of the State of Ohio* (6 vols.), 1941-42.

2. Riv. of U.S.A., second largest affluent of the Mississippi, formed by the union of the Allegheny and Monongahela at the W. foot of the Alleghenies, at Pittsburgh, in Pennsylvania, and flows W.S.W. 950 m., with a breadth of 1200 to 4000 ft., draining, with its tribs., an area of 202,400 sq. m. In its course it separates the N. states of O., Indiana, and Illinois from the S. states of Virginia and Kentucky. The prin. towns upon its banks are Cincinnati, Louisville (where there are falls), Wheeling, Maysville, and Pittsburgh and Cairo

at its source and mouth. It is navigable from Wheeling, 100 m. below Pittsburgh. It is the channel of a vast commerce, which it shares with its chief branches, the Tennessee, Cumberland, Wabash, Green, etc.

Ohlau, *see* OTLOWA.

Ohlenschläger, *see* OHEILENSCHLÄGER.

Ohligs, formerly Merscheid, tn. of the Rhineland, Germany, 17 m. N. of Cologne. There are weaving and dyeing works. Pop. 25,000.

Ohm, Georg Simon (1787-1854), Ger. physicist, b. at Erlangen, became prof. of experimental physics at Munich in 1852. He announced his law of the theory of the voltaic current in 1825, and pub. *The Galvanic Circuit worked out Mathematically* in 1827. *See* life by W. Gerlach, 1930.

Ohm, *see* ELECTRICITY AND MAGNETISM. (3) CURRENT ELECTRICITY, *Electromotive Force and Resistance*.

Ohmmeter, apparatus for measuring electrical resistance by direct pointer deflection in terms of ohms and megohms (a megohm is equal to 1,000,000 ohms). There are sev. types of Os., one consisting of two fixed coils with a third coil fixed at right angles to the other two and carrying a pointer which moves freely over a graduated scale, these coils being of high and low resistance. For testing the insulation resistance of cables, some type of magneto generator is combined with the instrument. Os. are employed both for the measurement of conductivity, e.g. of armature conductors and the like, and for the insulation of lighting systems, motor windings, etc. The principle of measurement is the same in both cases, but the resistance to be measured in the first case is very low, often no more than one-thousandth of an ohm, and in the latter case is rarely less than 1,000,000 ohms.

Ohm's Law, in electricity, states that the resistance of a conductor in ohms is equal to the potential difference between its ends in volts divided by the current flowing in it in amperes. Thus if a potential difference of 80 volts is applied to the ends of a conductor whose resistance is 40 ohms, a current of 2 amperes will flow through it.

Ohnet, Georges (1848-1918), Fr. author; b. in Paris, was educated at the Lycée Bonaparte. After 1871 he was editor successively of *Le Pays* and *Constitutionnel*. In collaboration with Denayrouze O. wrote his play *Reina Sarpi* (1875). *Serge Panine* appeared as a novel in 1881. *Le Maître de forges*, a novel afterwards famous as a play, appeared in 1882. O. was popular with lovers of romance.

Ohonamoochi, Onamuchi, or Okuni-Nushi, the earth-god of Jap. mythology, sometimes identified with Daikoku, god of wealth. His great shrine was at Kitzuki, in Idzumo, and was the second in importance in Japan. He was son of Susanoo-o, gc. of the underworld, and resigned his throne in favour of the present emperor's ancestors.

Oich, Loch, lake of Inverness-shire, Scotland. It is 4 m. long and 1 m. broad, with a depth of 150 ft. The loch is drained by the R. O. into Loch Ness at Fort Augustus,

and forms part of the Caledonian Canal. The loch is famous for its trout and salmon fisheries.

Oidium, name given to the conidial form of various ascomycetous fungi (Erysiphaceae) which give rise to what are popularly known as mildews and moulds. In this stage the white cobweb-like mycelia produce simple conidiophores, from which the conidia quickly germinate and grow in chains, covering the host as with a mealy powder. The life-cycle is completed in the autumn, when ascocarps, or perithecia, arise as small black points on the mycelium and produce spores which usually remain dormant through the winter and germinate in the following spring. In cases where the life-cycle is known the fungus is placed in its proper genus, but where the ascocarps are still undiscovered, the use of the term generically is still adopted.

Oil, see OILS AND FATS; OIL WELLS; PETROLEUM.

Oil and Petrol Engines, see INTERNAL COMBUSTION ENGINES; MOTOR CARS; MOTOR CYCLES; MOTOR BOATS; and MOTOR SHIPS.

Oil-beetle, name given to any species of *Meloe*, a genus of (cantharidae (q.v.), on account of the oil-like matter which it exudes.

Oil-bird, see GUACHARO.

Oilcake, richest and most concentrated of cattle foods, manufactured from oil-bearing seeds after they have been crushed to extract some of the oil. The cakes in most common use in Britain are those prepared from linseed, cotton seed, and soya beans. Linseed cake contains from 10 to 12 per cent of oil, and if fed in moderate quantities is the best stock food of its kind. Decorticated cotton cake is made from cotton seed after the husk has been removed, and is valuable for fattening bullocks and dairy cows. Undecorticated cotton cake, made from the whole seed, is generally given to cattle fattening upon grass. Soya-bean cake, a recent introduction, is valuable for all classes of stock.

Oil City, city of Pennsylvania, U.S.A., in Venango co., at the mouth of the Oil Creek, at its junction with the Allegheny R., 52 m. S.E. of Erie. It is one of the chief oil centres in the state. The city has been three times partially destroyed by flood and fire. Pop. 20,100.

Oilcloth, see FLOORCLOTH; LINOLEUM.

Oil-drop Experiment, see under ELECTRON; MILLIKAN, ROBERT ANDREWS.

Oil Fish, see GLOMYSNA.

Oil Fuel, see FUELS, Liquid Fuel.

Oil of Vitriol, see SULPHURIC ACID.

Oil Paint, see PAINTS; PIGMENTS.

Oil Painters, Royal Institute of, was founded in 1883, and achieved the prefix Royal in 1909. Ann. exhibitions are held at galleries in Piccadilly, London.

Oil-painting, see under PAINTING.

Oil Rivers, see NIGER.

Oil Rivers Protectorate, former name of the Niger Coast Protectorate. It was given to the new protectorate proclaimed over the coastal area of Nigeria following the Berlin Act, 1885, and it included most of

the present coast, but not Benin or the country to the W. Though the protectorate was proclaimed with due solemnity no steps were taken to make it effective or to establish any useful form of administration, the reason for this laxness being that Great Britain had been forced by the Berlin Conference and the influence of Bismarck to take a step very much against its inclination and policy. In 1891 the gov. created a compromise administration of consuls and vice-consuls, who were appointed to the various rivers, with powers like those of a modern dist. officer, under a commissioner and consul-general. An armed constabulary was raised and commanded by Brit. officers with armed launches to patrol the creeks. In 1893 the name of the protectorate was changed to Niger Coast Protectorate. See further under NIGERIA.

Oils, Essential, see ESSENTIAL OILS.

Oils and Fats are either glyceryl esters of the fatty acids (animal and vegetable oils) or hydrocarbons (mineral oils). In the former, the relative proportion of solid and liquid glycerides determines whether the substance is a fat or an oil at ordinary temps. Oils may be colourless to yellow, are not miscible with water, and have a sp. gr. of less than 1, and will be considered here as: (1) Mineral or hydrocarbon oils. This class includes natural essential oils mainly of vegetable origin, mineral oils like petroleum, oils obtained by distillation, coal tar oils, shale oils, bone oils, etc. (2) Fatty oils, which may be saponifiable (i.e. hydrolysed by caustic alkalis or not). Saponifiable oils, etc., include glycerides and some essential oils, whilst non-saponifiable products include fusel oil, camphor oils, cholesterol, phenol, cresol, and many others. (1) *Hydrocarbon oils* are obtained either by the distillation of oil-bearing shales (Scotland) or from the petroleum of America, Russia, etc. The Scottish oils are mainly paraffins (q.v.), the Russian petroleum is composed chiefly of naphthenes, while the Amer. petroleum consists of paraffins, with olenes and naphthenes. For commercial purposes crude petroleum is distilled and fractionated. Thus are obtained colourless oils used as solvents (petroleum ether), cleaning oils and oils for varnishes, burning oils (kerosene), and lubricating oils. (See PETROLEUM.) These minerals are chemically more or less inert, and are unaffected by acids and alkalis at ordinary temps. (2) *Fatty oils* are obtained from animal fats and seeds of plants by pressure or extraction by volatile solvents. These fats and oils are chiefly composed of tristearin, tripalmitin, and triolein, and are easily decomposed to glycerol (q.v.) and the fatty acids (see FATS). They are soluble in ether, benzene, and chloroform, and are only slightly soluble in alcohol (except castor oil, which is soluble). The fatty oils are divisible into three groups: (1.) *Drying oils*. These when exposed to the air absorb oxygen and harden. Such oils are valuable as painting oils, e.g. castor (dehydrated), linseed, poppy-seed, and flax-seed, (2.) *Non-drying oils* are used for lubricating

purposes. Such are butter, lard, tallow, olive, palm, whale, seal, coco-nut oil, and castor (in natural state). (ii.) *Semi-drying oils*, intermediate between (i.) and (ii.), e.g. rape, colza, castor, croton, and grape-seed oils. Boiled with caustic alkalis, fats and oils of this series undergo saponification, and are used in the manufacture of soaps (q.v.). Stearin is used in making candles, as also are palm oil and tallow. Castor oil is used in certain types of lubrication, e.g. aviation, and in medicine, while some of these fats and oils are used as foods, viz. butter, lard, and coco-nut oil, and others as burning oils—colza and sperm oils.

The examination of oils and fats is a highly technical matter and involves such observations and determinations as taste and smell, colour, refractive index and dispersion, fluorescent effects, spectroscopic work and behaviour under polarised light, solubility in various solvents, heat of combustion, conductivity, melting point, sp. gr., viscosity, and complete chemical analysis, including the water content. In some cases *flash point* (q.v.) is a useful piece of information. Another important factor is the *iodine value*. Thus in Hübl's test the alcoholic solution of mercuric chloride and iodine in alcohol is made. Then a solution of the oil under test is made up in chloroform and the iodine solution added to it. Excess of the latter solution is used and after adding potassium iodide solution the amount of the excess of iodine is found. From the results the amount of iodine absorbed by a known weight of the oil is then calculated. The Reichert value of a fat is obtained by heating 2.5 gm. of the fat with 5 c.c. of pure alcohol and 6 c.c. of strong KOH solution. After heating on the water-bath the soap produced is extracted with 70 c.c. of boiling water and sulphuric acid of the proper strength to neutralise the alkali added. The liquid is distilled till 50 c.c. have come over. The distillate is neutralised by decinormal alkali. The number of c.c. used gives the Reichert value. The Maumene test depends on the heat produced when a fixed oil is mixed with sulphuric acid. Comparisons are made with standard cases.

Oil-Shale, see *under* SHALE OIL.

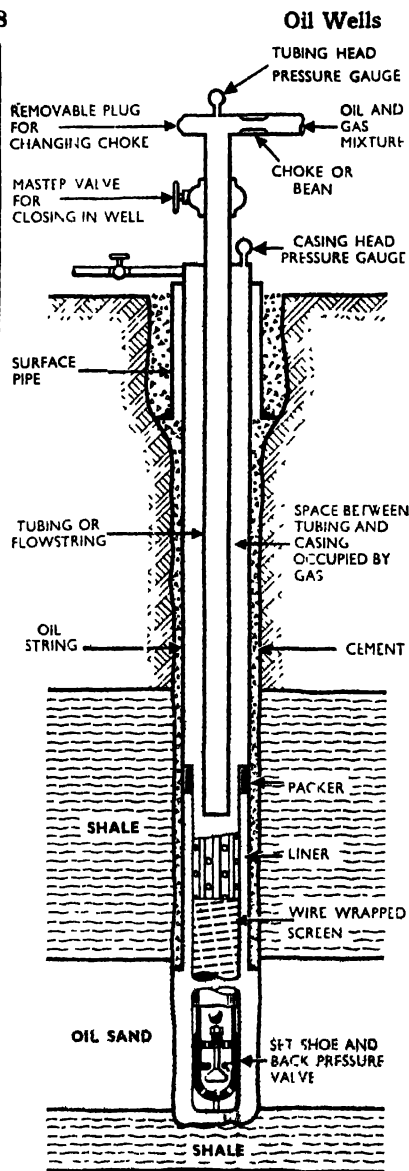
Oil Ships, or Oil-tank Steamers (Oil Tankers), form one of the classes of vessels which are expressly built with a view to the requirements of a certain class of cargo, and can under ordinary circumstances be used for no other. As early as 1863 there were sailing ships on the Tyne with specially constructed tanks for the carriage of oil, but the *Vadreland*, which was probably the first steamship designed to carry oil, was built by Messrs. Palmer in 1872. Another early steamship of this type was the *Zoroaster*, built in Sweden in 1877, in which the O. tanks were separate from the hull; later vessels were built in which the plating of the hull itself formed the tank. The size of O. steamships varies in accordance with the length of journeys required, etc.; for long journeys vessels of from 6000 to 12,000 tons are found to be the most economical. The

Pinna was a good example, being 420 ft. long, 52 ft. broad, 22 ft. deep, and accommodating 9000 tons of O. in twelve large tanks formed by one longitudinal and seven transverse bulkheads. A later development is the O.-tank vessel fitted with internal combustion engines instead of steam. The biggest of these ships can carry 16,000 tons of liquid cargo. It is important in vessels of this class that the free surface of the O. should be as small as possible. The world demand for O. in recent times has led to extensive building of O.-carrying vessels, and since 1926 the number of such ships has rapidly increased. Many of them are motor driven, the largest being the *C. O. Stillman*, a twin-screw ship of 16,000 tons built in 1928 for the International Petroleum Company. She had a length of 565 ft. In 1930 there were 1462 engine-driven ships and 200 sailing ships. At the outbreak of the First World War there was under 1,500,000 gross tons of O. tankers. When war again broke out in 1939 the total had grown to nearly 11,000,000 tons. Great Britain had the greatest number, being followed by America, Norway, Holland, Panama, Japan, Italy, France, Germany, and Sweden. An O. tanker may be easily recognised because the funnel and machinery are aft and the bridge just forward of amidships. All the hold space, 400 ft. long in the largest tankers, is divided by two steel structures running parallel with the centre line of the ship. These are the fore and aft bulkheads, and the three long trough-like spaces thus formed are further subdivided by cross divs. or transverse bulkheads. There may be a dozen of these, making about thirty individual tanks, into which and out of which O. must be moved by pumps with the greatest possible speed. These pumps control the flow of O. in each of the three lines of compartments, and some of them are able to pump 2800 gallons of fuel a minute. Other pumps keep the air pure to prevent explosions. See Sir A. Hurd (ed.), *Britain's Merchant Navy*, 1925-29; R. W. Morrell, *Oil Tankers*, 1931; and P. Kerr, *Tank Strapping*, 1939.

Oil Wells. The word 'oil' is applied in this case to rock oil or petroleum, which is found in various places at lesser or greater depths in the earth's crust. It most commonly occupies the pore spaces between the grains of sedimentary rocks. Two factors are essential to hold the petroleum in its reservoir. Firstly a suitable impervious 'cap' rock or seal to prevent its escape into higher layers, and, secondly, a 'structural' or 'stratigraphical' closure to trap the oil and prevent its further movements within the layer. The deposits are usually associated with water and gas—the water, being the heaviest, occupying the lower part of the structure. The method used in the recovering of petroleum from these natural reservoirs is by the sinking of wells.

The art of well-drilling dates back to 221 B.C. when it was first practised in China, where brine wells as deep as 3500 ft. have been drilled with equipment of a very primitive nature. The first well

sunk with the definite object of obtaining oil, using other than hand power, was drilled at Titusville in 1859 by Col. Drake. Nowadays before a well is sunk the country is first surveyed geologically, and this surveying of a country unknown as far as its oil possibilities are concerned can be divided into two parts. It is first necessary to know if geological, especially stratigraphical, conditions are such as to have favoured the generation of oil. Then if it is considered that conditions are favourable, the region must be examined for structures in which oil could accumulate. After geologists and geophysicists have found what appears to be a favourable location for drilling, the prospect is sometimes further checked by drilling a number of small diameter wells (see BORING), usually with a very light drilling rig known as a core drill. The first well in an oilfield is usually known as a 'wild-cat,' the old-time wells having been often located by pure guesswork or superstition. Hence the present-day colloquial meaning of 'wildcat'—'highly speculative.' All wells drilled with the object of discovering a new structure, a new pay zone, or of extending the productive area of known pay zones are 'exploratory' wells. Those wells extending a known field are 'extension' or 'outstepping' wells. Wells drilled for deeper pay sands in the same field are 'vertical exploration' wells, while those drilled within the known boundaries of a proven field are known as 'exploitation' or 'development' wells. In modern drilling the first structure of the drilling rig to be built is the derrick, this being, in the case of permanent wells, a structural steel tower which for wells which it is expected will reach a depth of 10,000 ft. is 136 ft. high, plus an additional 13 ft. for the 'gin pole,' which is installed over the top to facilitate the installation of the 'crown block' (pulleys). The 30-ft.-square derrick floor, which is surfaced with boards and stands 8 to 14 ft. off the ground, is the working platform for the crews. The hoisting winch or 'draw-works,' by which the drill pipe, casing, and tubing is handled, is driven by three or four engines installed behind it. The hoisting equipment consists of the crown block on top of the derrick and a travelling block which moves up and down the derrick by means of the hoist and a multiple cable arrangement. The original 'percussion' system has been superseded by the 'rotary' method, involving the use of a rotary table. The rotary table is a heavy steel table, mounted on ball or roller bearings with a bevel gear under its outer rim. This is set over the centre of the well and rotates the drill pipe. A large diameter bit is used for drilling, and a special type of mud is injected into the hole to facilitate the operation. When the hole has reached a depth of 50' to 300 ft., steel casing is inserted and cemented in to prevent the sides caving in and water seeping through, this performance being repeated from time to time as the depth increases. Just before the 'cap' rock is pierced a system of high-pressure valves, called a 'Christmas tree,' is installed to control the flow



FLOWING WELL: COMPONENT PARTS

of oil. The old spectacular days when wells flowed over the top of the derrick when being brought into production are

gone, and bringing in the modern well is usually a controlled and orderly procedure. Generally the oil is forced to the top naturally, but after natural flowing conditions stop it is necessary to install additional equipment to lift the oil, usually done by mechanical pumping. The oil is then conducted through pipes, often hundreds of miles long, to the refinery. The deepest well at present has reached a depth of over 17,000 ft. See also **PETROLEUM**. See A. Beeby Thompson, *Oilfield Development and Petroleum Mining*, 1916; J. E. Brantly, *Rotary Drilling Handbook*, 1936; A. Holmes, *Principles of Physical Geology*, 1944; and W. F. Cloud, *Petroleum Production*, 1946.

Ointment, fatty substance of the consistence of butter, generally containing some medicinal agent, and intended to be applied to the skin for curative purposes. The fatty basis may be any substance sufficiently plastic, without any injurious action on the tissues and not liable to putrefaction; that most generally used is purified lard with an admixture of wax, the usual proportion being eighty parts of lard to twenty of wax. A harder O., used for conveying liquid antiseptics, is made up of f. or parts of solid paraffin, one of wool fat, and five of liquid paraffin. A soft O. base in general use consists of eleven parts of solid paraffin, five of lanolin, and thirty-four of liquid paraffin.

Oirat, Autonomous Region of the R.S.F.S.R., situated on the Mongolian frontier, with the Altai Ter. to the N., the Kazakh S.S.R. to the W. and S.W., and the Khakass Autonomous Region to the E. About 45 per cent of the pop. are Russian immigrants, the rest being Os. and Tartars, with some Kalmuck groups of Mongol descent. Settlements consist of small wooden houses, where home handicrafts are still carried on. The pop. is chiefly rural, and there are few significant settlements, except the cap., O. Tau, a fair-sized tn. with hydro-electricity. There are large herds of cattle, roads have been built, and the butter industry flourishes. O. is in the Altai-Sayan mt. system, and its scenery resembles that of Switzerland. Area 93,000 sq. kilometres. Pop. 161,000.

Oirat Tau, cap. of the Oirat Autonomous Region (q.r.). Pop. 12,000.

Oisante, see **ANATASE**.

Oise: 1. Dept. in the N. of France, is bounded on the E. by the dept. of Aisne, and on the W. chiefly by that of Seine-Inférieure. It produces an immense quantity of vegetables and manufs. hardware and textiles. Cap. Beauvais. Area 2272 sq. m. Pop. 396,700. 2. Riv. of France, an affluent of the Seine, rises in the N. of the dept. of Ardennes, and flows S.W., joining the Seine at Conflans-Sainte-Honorine after a course of 150 m., for the last 75 of which it is navigable.

Oisin, see **OSSIAN**.

Oita, seaport tn. of N.E. Kiusiu Is., Japan, 100 m. from Nagasaki, in the dept. of the same name. Silk yarn is produced. Pop. (tn.) 61,700, (dept.) 980,400.

Ojibways, or **Ojibseways**, see **CHIPP-EWAYS**.

Oka: 1. Riv. of Siberia, Asiatic Russia, rising in the Sayan Mts. between China and the Irkutsk Region, and flowing N.E. through a wild mt. region for a course of about 400 m., to join the Angara at Bratsk. 2. Riv. in central Russia, rising in the Orel Region, and flowing after many windings in a N.E. direction, for a course of about 900 m. in all, to join the Volga at Gorky. Its basin has an area of about 120,000 sq. m., and the traffic on it is very considerable, over 2,000,000 tons of corn, salt, metals, timber, etc., being loaded annually for shipping in the riv. ports of its basin.

Okapi, native name of the species of Giraffide discovered by Sir Harry Johnston in 1901 in the Semliki forest, Belgian Congo; it is known technically as *Okapia johnstoni*. This giraffe-like animal differs from its allies in having a rather short tail, a short, thick neck, no external horns, but vestiges of horns are to be found on the frontal bone. The coloration of the O. is curious; the limbs bear long, dark stripes, the back and sides are reddish-brown, while the limbs and part of the head are of a creamy colour. Very little is known of the habits of the O. beyond that they live in pairs in dense forests. The only pair of their species in Europe is in the London zoo.

Okavango River, see **CUBANGO**.

Okayama, tn. of Honshu, Japan, cap. of prefecture of same name, 72 m. W. of Kobe. It has a fine castle and beautiful gardens. Silk and cottons are produced. Pop. 166,100.

O'Keefe (O'Keefe), John (1747-1833), Irish dramatist and actor, b. in Dublin, whose plays enjoyed considerable popularity in London. They include comedies, farces, and operas, such as *The Agreeable Surprise* (1781); *The Poor Soldier* (1783); *Wild Oats* (1791); and *Modern Antiques* (1791). He wrote the popular song *I am a Friar of Orders Grey* (this occurs in his opera *Merry Sherwood*). His *Recollections* appeared in 1826. See lives by R. W. Babbcock, 1937, and Adelaide O'Keefe, 1937.

Okehampton, municipal bor. and mnrkt. tn. of Devonshire, England, 21 m. W. of Exeter, on the N. margin of Dartmoor, at the junction of the E. and W. Okement. There are picturesque ruins of a late Norman keep and of O. Castle. Pop. 3900.

O'Kelly, Sean Thomas (Seán Tomas O'Ceallaigh) (b. 1882). Irish journalist and political leader; educated at O'Connell School, Dublin; Republican M.P. for N. Dublin (1918-24). One of the founders of Sinn Féin (q.r.), with Arthur Griffith (q.r.) he was Speaker of the first Dail Eireann in the Irish Free State (1919-31). O. was successively Irish envoy to Paris and Rome, 1919-22, and to the U.S.A., 1924-26; vice-president of the executive council and minister for local gov. and public health, 1932-39; minister of finance and of education, 1939; member for Dublin N. of the Dail from 1927 to 1945; proprietor and editor of the *Nation* (Dublin); general secretary of the Gaelic League; vice-president of the Fianna Fail

party. He succeeded the Gaelic scholar, Dr. Douglas Hyde, as president of Ireland, being installed on June 25, 1945.

Oken, Lorenz (1779-1851). Ger. naturalist, b. at Hohlsbach, Swabia. His real name was Okenfuss. In 1802 he pub. a work entitled *Grundriss der Naturphilosophie, der Theorie der Sinne, und der darauf gegründeten Classification der Thiere*, first of a series of works of the same nature. In 1828 he was appointed prof. at Munich, and four years later at Zürich. See memoirs by A. Ecker, 1880, and C. Guttler 8184; and M. Pfannenstiel and R. Zau-nick, *Lorenz Oken und J. W. Goethe*, 1941.

Okhotsk, Sea of, inlet of the N. Pacific in the E. of Siberia. From Nov. to April it is ice-bound.

Okhrida, Okhrid, or Orid, see OKRIDA.

Oki Islands, group of is. lying N. of the prov. of Izumo, and a former Jap. possession. There are, in all, four is., Dago being the largest; chief tn. Saigo. The group has a coastline of 182 m. and covers an area of 130 sq. m. Pop. 31,800.

Okinawa, Pacific is. of the Ryukyu group, 325 m. from the Jap. mainland, the centre of a former Jap. prefecture, and an air base. It is long and narrow, with an irregular coastline and peninsulas projecting W. and E. Length from N. to S., 65 m.; maximum width, 10 m.; area 485 sq. m. For the Amer. capture of O. in 1945 see PACIFIC CAMPAIGNS or FAR EASTERN FRONT IN THE SECOND WORLD WAR.

Oklahoma (Choctaw Indian word meaning red people), S.-central state of the U.S.A., called the Sooner State, bounded on the N. by Kansas, E. by Missouri and Arkansas, W. and S. by Texas. One narrow strip touches New Mexico and Colorado on the W. Area 69,919 sq. m., including 643 sq. m. of water. The surface is principally an upland prairie, and large portions are very fertile, though others are bare and arid. O. rises in the W. to an elevation of 4000 ft. and there are mts. in the S.W. It is well watered by the Red, Canadian, and Arkansas Rs., with their affluents. The chief mt. ranges are the Chautauque Mts. in the S. part of the state; the Chautauque Mts. in the central portion; and the Ozark Mts., extending half-way across the state. O. is noted for its diversity of crops, corn, cotton, wheat, oats, maize, potatoes, etc., being extensively cultivated. The first named represents over two-thirds of the acreage and value. Yields in 1917: maize, 22,000,000 bushels; wheat, 104,000,000; oats, 83,000,000; grain sorghums, 5,000,000. Soil erosion is serious. Between 1935 and 1940 the number of farms declined by 15.9 per cent (33,600), and between 1940 and 1945 by nearly 15,000, or another 8.3 per cent. Large-scale commercial farming is the prevailing form, though there is still some subsistence farming. The state also possesses an abundance of fine timber, and wool is produced. Petroleum, coal, rock-asphalt, limestone, and gypsum are found, the value of the total mineral output for 1946 being \$326,000,000. In 1947 over 111,000,000 barrels of petroleum were produced. Petroleum refining is the

chief industry, output being valued at \$326,000,000. Indians, wards of the nation, received (in 1930) over \$36,000,000 in royalties on oil discovered in their lands. About 280,000,000 gallons of natural gasoline and 345,000,000,000 cubic ft. of natural gas were produced in 1945. The state has a Senate of forty-four members and a House of Representatives of 114 to 120 members elected for four and two years respectively. O. sends two senators and eight representatives to Congress. The state was a part of the Louisiana Purchase. From 1866 onward the Indian country, as it was known, became gradually settled by the purchase of Indian lands by the gov. Organised as a ter., 1890, and admitted as a state, 1907, it was originally known as Indian Ter. because on the great reservations were settled Cherokees, Creeks, Choctaws, Chickasaws, and Seminoles. Their descendants remain a large part of the present pop. of O. The chief cities are O. City (the cap.), 267,000; Tulsa, 180,200; Muskogee, 32,300; Enid, 28,000; Shawnee, 22,000; Lawton, 18,000; Ardmore, 17,000; Ponca City, 16,800; Bartlesville, 16,300; and Okmulgee, 16,000. Pop. of the state 2,352,000. See Edna Ferber, *Cimarron*, 1936; Federal Writers' Project, *Oklahoma: a Guide to the Sooner State*, 1941; G. Foreman, *A History of Oklahoma*, 1912; A. Debo, *Prairie City*, 1914; and M. James, *The Cherokee Strip*, 1917.

Oklahoma City, cap. of O., U.S.A., on the N. Fork of the Canadian R. It is a new city settled in 1889, and has many handsome buildings and tree-lined streets. Its univ. was founded in 1911. It does an important trade in cotton, cattle, horses, and other stock, and has stock-yards and tanning factories. Pop. 267,000.

Okuni-Nushi, see OKUNOSUCHI.

Olaf I. (Olaf Trygvesson) (969-1000), king of Norway. On being proclaimed king in 995 he began the conversion of the country to Christianity, built the first churches, and founded the see of Nidaros, formerly Trondheim. He entered into quarrels with both Sweden and Denmark, and finally met his death off the is. of Svold, near Trugen, where he was waylaid and defeated by the combined Swedish and Dan. fleets. After his death he remained the hero of his people.

Olaf II., the Saint (955-1030), revered early Norwegian king. He wrested the throne from Eric and Earl Sveyn (Svend Jarl) in 1015, and then endeavoured to terminate paganism with severity, which caused his subjects to seek protection in the ters. of Canute. O. was, however, dethroned by Canute in 1028, but in 1030 he returned with 4000 men, and gave Canute battle at Stiklestad, near Drontheim, where O. was defeated and slain. O. was proclaimed patron saint of Norway in the succeeding century.

Öland, long and narrow Swedish is. in the Baltic, separated from Sweden by Kulmar Sound. It is 85 m. long and 10 m. at its broadest, and covers an area of 519 sq. m. It is well wooded in parts, and has good pasture ground for cattle. There are good fisheries all round the

coast; cement and alum works; and grain and sandstone are largely exported. Borgholm, on the W. coast, is the cap. and only tn. Pop. 27,000, of whom some 10,000 are in Borgholm.

Olaus Petri, see PETRI.

Olaux, typical genus of the family Olacaceæ, consists of about thirty shrubs and trees inhabiting tropical regions of Asia, Africa, and Australia. The species are smooth evergreens, and have a disagreeable odour. *O. Zeylanica* is the mallatree of Ceylon, the leaves of which form an ingredient of curry.

Olbens, Heinrich Wilhelm Matthäus (Matthias) (1758-1810), Ger. physician and astronomer, b. at Arbergen, near Bremen, studied medicine at Göttingen (1777-80). His new method of calculating the orbit of a comet, set forth in *Abhandlung über die leichteste und bequemste Methode die Bahn eines Kometen zu berechnen* (1797, 1864), won him fame. He discovered the asteroids Pallas (1802) and Vesta (1807), and the O. comet of 1815. See Borchhausen, *Biographische Skizzen verstorbener Bremischer Ärzte*, 1814; Erman, *Brüderwechsel zwischen Olbens und Bessel*, 1852; and *Gesammelte Werke* (Schilling's ed., 1894-1900, 2 vols., and a 3rd later vol.).

Old Age Pensions. History. - The Eng. O. A. P. scheme does not rest upon either voluntary or compulsory contribution on the part of the recipients of pensions. The inherent defect of a contributory system, apart from the fact that it constitutes an insurance and not a pension scheme at all, is that very few people of those who are now in receipt of O. A. P. could possibly have set aside from their exiguous earnings anything by way of provision for old age.

The question of O. A. P. had been discussed for some time before the passing of the Act of 1908, and not only were various proposals submitted to the Royal Commission on the Aged Poor, which sat in 1895, but the different recommendations of the commission formed the subject of sev. Bills in Parliament, which were considered by parl. committees in 1899, 1900, and 1903. The apparent dilatoriness of the legislature was due to a variety of causes, the chief of which were the preoccupation of Parliament with the Boer war and the protracted discussions over the principle of contribution. Moreover legislative experiments in one country are bound to have their effect upon other countries; and with the fact before them that the O. A. P. systems already in vogue in New Zealand, Denmark, New S. Wales, Victoria, and Germany rested upon a contributory basis, voluntary or compulsory, the House of Commons proceeded with the greater caution. As a fact, the estimated cost of £7,440,000 for providing pensions to persons over seventy was under the mark, for the cost in 1911-12 was £12,450,000. The cost for the financial year 1940-41 had risen to nearly £50,000,000 (though from these amounts must be deducted the saving to the rates consequent on the automatic removal of the pauper disqualification for old age pen-

sioners). The scheme put forward by Chaplin's committee in 1899, and practically adopted by the select committee of 1903, was a contributory one, and though some of its proposals were adopted by the Liberals in 1906, its root-principle of contribution was rejected by Lloyd George (chancellor of the Exchequer) on the ground that any contributory scheme would practically exclude women altogether, apart from the fact that the majority of working men could not deflect from their weekly earnings a sufficient sum of money to make adequate provision for old age, in addition to that which they were then making for sickness, infirmity, and unemployment. The age limit, too, was a thorn in the side of departmental committees. Most of the bills relating to pension schemes, and all the committees that considered the subject, set that limit at sixty-five years, and the same limit was fixed by the statutes governing the grant of pensions in New Zealand. It was estimated in 1903 that if the age limit were raised from sixty-five to seventy the number of pensioners would be reduced by nearly 44 per cent, which on the estimated figures would have meant 357,000 old age pensioners. The actual number of pensioners in Great Britain in March 1912 was 942,160, or about one person out of every forty-four of the total pop. The total number of O. A. P. in force in 1931 was about 930,000. The great majority of the pensioners were in receipt of the full pension of 5s. (or 10s. under the later Acts), those in receipt of lesser sums being for all practical purposes a negligible quantity. Of the pop. of seventy years of age or over about four in every five persons now draw O. A. P., to the extent of, in all, approximately £1,000,000 weekly to some 2,000,000 pensioners, comprising roughly one-third non-contributory Act and two-thirds contributory Act State O. A. P. It is obvious from these figures that the fears of the different committees were not groundless. But, indeed, no one conversant with poor law statistics could have failed to appreciate the fact that the cost would be heavy, for of the entire pop. of sixty-five years and upwards in the United Kingdom more than one-quarter were (1899) in receipt, or had been in receipt, of poor law relief. The Acts of 1908 and 1911 were subsequently amended in various particulars by the Acts of 1919, 1924, and consolidated by the 1936 Act. The chief provisions are given below.

Statutory Conditions for Obtaining Pensions, and Disqualifications.—(1) The claimant must have attained the age of seventy. (2) The claimant must for at least ten years up to the date of receipt of any sum on account of pension have been a Brit. subject (a condition which, formerly, disqualified women who married aliens); b. this condition does not apply in the case of a woman who satisfies the pension authorities that she would, but for her marriage when an alien, have fulfilled the condition. (3) The claimant must, if a natural-born Brit. subject, have, since attaining the age of fifty years, have

had his residence in the United Kingdom for an aggregate period of not less than twelve years; and, if he is not a natural-born Brit. subject, that he has had his residence in the United Kingdom for an aggregate period of twenty years. (Residence abroad in the service of the Crown, temporary absence not exceeding three months at any one time, all periods spent abroad by any person during which he has maintained or assisted in maintaining any dependant in the United Kingdom, absence on board a registered Brit. ship, and residence in the Channel Is. or the Isle of Man by a person born in the United Kingdom, are all regarded as residence in the United Kingdom for the purposes of the Act.) The rates of pension given to persons of seventy years of age, are as follows:

(a) Where the claimant is one of a married couple living together in the same house; then, where the combined means of husband and wife (with a deduction not exceeding £78 from the combined means other than earnings) do not exceed £52 10s. a year, the rate of pension is 10s.; £52 10s. to £63, 8s.; £63 to £73 10s., 6s.; £73 10s. to £84, 4s.; £84 to £94 10s., 2s.; £94 10s. to £99 15s., 1s. Where the combined means exceed £99 15s. there is no pension. If each spouse is pensionable, each would receive the above rate of weekly pension.

(b) In other cases than the above; then, where the yearly means (with a deduction not exceeding £39 from means not derived from earnings) do not exceed £26 5s. a year, the rate of pension is 10s.; £26 5s. to £31 10s., 8s.; £31 10s. to £36 15s., 6s.; £36 15s. to £42, 4s.; £42 to £47 5s., 2s.; £47 5s. to £49 17s. 6d., 1s. Where the yearly means exceed £49 17s. 6d. there is no pension. Under the Old Age and Widows' Pensions Act, 1940, however, the above specific pension rates may be supplemented in case of needy pensioners (other than blind persons, for whom different statutory provision is made) by additional allowances. These allowances are payable, through the Post Office, by the Assistance Board (created in 1941) under the supervision of the Ministry of Health, the burden being thereby transferred from local authorities to the Exchequer. They are payable in accordance with the Supplementary Pensions Regulations, subject to the provisions of the Determination of Needs Act, 1941, under which the family means test was replaced by a test which only takes household needs into account.

It has been estimated that the cost of the O. A. P. scheme as enlarged by the provisions of the Act of 1940 will rise to nearly £87,000,000 by 1950. The Assistance Board announced in 1941 that it would increase supplementary pensions to pensioners not needing continuous medical attention or nursing to ensure them an income of 30s. a week, thereby enabling them to live in hostels to be established and maintained by voluntary organisations. The State had therefore accepted the view that social legislation should not be confined to money payments and legal safe-

guards, but should seek the good social life of its citizens.

Calculation of Yearly Means.—In calculating the ann. means of a claimant for a pension, account will be taken of the following items: (a) Five per cent on his capital in any shape or form (in the words of the Act of 1911, 'one-twentieth part of the capital value of any property belonging to him') and whether that capital be invested or not, but this valuation is subject to the exclusion of the first £25 of the capital value; the yearly value of the next £375 of the capital value of such property will be taken to be one-twentieth part of the capital value; and the yearly value of so much of the capital value of the property as exceeds £400 will be taken to be one-tenth of the capital value. (b) The cash income he may reasonably expect during the succeeding year (exclusive of O. A. P., interest on investments, and sums accruing from the profitable use of property not personally used by him); this, in the absence of other evidence, will be taken to be the income actually received during the past year. In calculating income no account will be taken of any amounts received during a period of not more than three months in any year by a person, or by the husband or wife of a person, as the case may be, under a medical certificate, as sickness benefit from a friendly society or a trade union. (c) The yearly value of any benefit or privilege (e.g. an easement (q.r.), fuel allowance, right of common (q.r.)). In calculating the means of a person who is one of a married couple living together in the same house, the means are taken to be one-half of the total means of the couple, and where either of the couple, or the couple jointly, is or are entitled to any property, each of them is deemed to be entitled to one-half of the property. Where the husband is separated from the wife, any sum he has paid to her under a separation order will be deducted in calculating his means. The basis of assessment of property capable of investment is the income that might be derived from it if it were invested; but a claimant is not bound to convert his capital into an annuity, and his income must not be estimated on the assumption that he ought to do so. Under the Act of 1908, if it appears that the claimant has directly or indirectly deprived himself of any income or property in order to qualify for an old age pension, or in order to get a higher rate of pension than he otherwise would be entitled to, such income or property will nevertheless be taken to be part of his means.

Mode of Applying for Pensions—Pension Committees.—The authority for dealing with claims is the local pension committee appointed by the bor., co., or dist. council. The form of claim for a pension may be obtained by the claimant free of charge at any post office at which he desires the pension to be paid to him. When filled up the form is to be delivered by the claimant either to the postmaster or the pension officer of the dist. The postmaster must give the claimant all the

assistance he can in cases of doubt. The pension officer is appointed by the Treasury, and is the local officer of review, or the supervisor of inland revenue. His function is to investigate the claims sent in and to report on them to the pension committee which body then investigate the claims themselves and give their decision upon them. Before deciding adversely on a claim they give the claimant an opportunity of being heard in support of his application. There is an appeal from the committee's decision to the Ministry of Health. Where the pension is allowed the pension officer gives the pensioner a book of pension orders enabling him to get payment at the post office. A question may be raised at any time during which a person is drawing a pension as to whether he is properly qualified or whether his means are such as to entitle him to payment at a particular rate. If a later decision of the committee reverses a former decision so as to give the pensioner a lower rate or no pension at all, he will not in the absence of fraud on his part have to repay any sums received by way of pension. Conversely the committee may at any time decide to give a higher rate of pension to a person if his circumstances have so changed as to warrant the higher rate. A person who knowingly makes false statements for the purpose of obtaining or continuing to obtain a pension either for himself or any other person renders himself liable to imprisonment not exceeding six months with or without hard labour.

Contributory Old Age Pensions.—Under the Widows' Orphans' and Old Age Contributory Pensions Act 1925, all contributors to the national insurance scheme who were between sixty-five and seventy years of age on Jan. 2, 1925 or who have reached the age of sixty-five since that date are entitled to an old age pension of 10s a week irrespective of their means. The chief conditions are that they have been continuously insured for not less than five years immediately prior to Jan. 2, 1925 and have paid at least 10s contributions. A similar pension is payable to the wife of a contributor entitled to such a pension as from the date her husband receives his pension. Under the Old Age and Widows' Pensions Act (Part II) 1940 widows of contributory pensioners are admitted to pension at the age of sixty (under the Act of 1925 the age was sixty-five), and similarly the pension age for insured women is sixty. Such contributory pensions payable up to the age of seventy are thereafter continued as O.A.P. irrespective of means as applied to other old age pensioners under the 1908-24 Act. By an Act of 1932 (which came into force on Jan. 2, 1930) similar pensions are payable to all widows over fifty-five years of age of men of the insurable class who died or reached the age of seventy before Jan. 4, 1926 (the date when the 1925 Act came into force). The date of commencement of these pensions was July 1, 1930 in the case of widows who were over sixty on that date and Jan. 1, 1931, in the case of those who were

then between fifty-five and sixty years of age. The Old Age and Widows' Pensions Act, 1940 provides that O.A.P. and pensions to widows over sixty may be supplemented in case of need, by the Assistance Board. Under a later Act (1945) widow pensioners under sixty were made eligible for supplementary pensions if they have children in respect of whom an allowance is being paid. Provision is also made to insure persons to preserve their rights to pensions by becoming voluntary contributors after migration to the dominion. An old age pension is not payable to any man so long as he is entitled to a civil war pension under the above Acts. Neither than one old age pension which is under the Act of 1925 or the Old Age Act 1940. Acts 1908-24 is payable to any man.

In 1942 there were 4,000,000 old age and contributory pensioners as well as 860,000 widows in receipt of pensions, of whom 20,000 drew at a value of the contributions paid by their husbands. In that wartime year some 1,000,000 old age pensioners were again receiving benefit and under 2,000,000 widows were living off employed men. In 1942 some 600,000 persons were in receipt of contributory pension and the amounts received varied very widely. The effects of the Old Age and Widows' Pensions Act 1940 and the Determination of Needs Act of 1941 were far reaching. In addition to some 2,000,000 cases of supplementary allowances to old age pensioners is taken over from the local authorities by the Assistance Board some 700,000 had by 1942 received supplementary pensions and including 100,000 cases included under the Determination of Needs Act the board was then paying supplementary pensions in 1,100,000 cases representing 1,300,000 pensioners. The total amount paid to old age pensioners had by that year reached £125,000,000 a year of which however, non-contributory pensions accounted for only £12,000,000 while contributory pensions were £80,000,000 and supplementary pensions £13,000,000. The total cost to the Exchequer increased to tenfold that of the original 1925 pension scheme introduced after the First World War. In 1946 the total cost of O.A.P. payable was £2,500,000,000, and £1,500,000,000 under the Contributory Pensions Act and £450,000,000 the amount paid in 1946 to an unpaid £59,412,000. Pensioners and widows totalled 4,774,000 expenditure upon them being £1,710,000.

Blind Old People.—Subject to inability to do any work in which eye-sight is needed, the blind are under an Act of 1920 entitled to a pension of up to 10s a week at the age of fifty, but by the Act of 1936 the age was reduced to fifty on registration (which is optional, of the 74). Blind persons in England and Wales (1940), 13,280 were over forty, and therefore eligible for pensions.

Dominions Schemes.—Under the Old Age Pensions Act, 1921, Canada persons of seventy years of age and upwards whose income from other sources is less

than \$365 a year, are entitled to a pension, the maximum rate being \$20 a month. This amount is lessened by the amount of private income. Originally the Dominion Gov. reimbursed each prov. participating in the dominion scheme to the extent of one-half of the prov. expenditure for O. A. P. An amendment passed in 1931, however, provided that the dominion contribution should be increased to 75 per cent of the prov. disbursements, and this allocation became effective from Nov. 1, 1931. The Dominion Old Age Pensions Act is now operative in all provs. and in the N.W. ters. The total number of pensioners as at Dec. 31, 1941, was 186,831, and the Dominion Gov.'s contributions from the inception of the Act of 1927 to Dec. 31, 1941, was \$231,010,822. The administration of the Old Age Pensions Act was transferred to the Dominion Dept. of Finance in 1935. By an amendment to the Act in 1937, provision was made for the payment of a pension to every blind person who complied with certain conditions which are very similar to those prescribed in the Brit. scheme.

In Australia an O. A. P. system was introduced by the Commonwealth Invalid and Old Age Pension Act, 1908, which became operative on July 1, 1909 (invalid pensions were first paid from Dec. 15, 1911). The rate of pension under the original Act was £26 per annum, the limit of income of the pensioner (including pension) being £52. The rates have, however, been changed from time to time; thus in 1937 the ann. pension rate was £52, and the limit of income £54 10s. Provision was made by the Financial Relief Act, 1933, for an ann. review of the rate of pension, based on the cost-of-living index number, and under that Act the maximum rate of pension was fixed at £52 and the minimum at £15 10s., but the latter figure was changed in 1936 to £16 10s. In 1916 an old age pension of 32s. a week was first paid to pensioners who became inmates of benevolent asylums. This rate was increased from time to time, and in 1937 was 6s. a week. Asiatics, generally, are not eligible for invalid or old age pensions, unless born in Australia, but by an amending Act of 1926 pension rights were extended to Indians who were born in Brit. India. The maximum pension now payable to a blind person in Australia is £52 per annum and the limit of income is £227 10s. a year. In 1948 there were 302,851 O. A. P. in force. The number of invalid pensioners in 1948 was returned at 73,073. The actual sum disbursed in old age and invalid pensions in the financial year 1947-48 (apart from the cost of administration, etc.) was £36,526,000.

In New Zealand earlier legislation was superseded by the Social Security Act, 1938, which had two main objects: (i.) to substitute for the system of non-contributory civil pensions a system of monetary benefits on a contributory basis; (ii.) the inauguration of a system of medical and hospital benefits and other related benefits. The various classes of pensions superseded by these new benefits

were O. A. P., widows' pensions, invalidity pensions, etc., and four new classes of benefits were introduced, including universal superannuation benefit, sickness benefit, etc. Every person over sixty-five, who satisfies the required residential qualifications, is entitled to a superannuation benefit without conditions as to income or property. The rate of benefit is £10 a year, with increments of £2 10s. a year up to a maximum rate of £78 a year (which can, therefore, not be reached until 1968). Again, every person who has reached sixty is entitled to an 'age benefit,' subject to residential qualifications and also to a character qualification (mainly relating to desertion and failure to provide maintenance). The basic rate for this benefit is £78 a year subject to any increase that may be granted on account of dependants or to deductions on account of income or accumulated property. Invalids' benefits are payable at a basic rate of £78 a year for a married man and £52 for a single person, and the benefit is payable irrespective of age, except that the applicant must be sixteen years or over. An 'emergency benefit' may be granted by the Controlling Commission (which controls the Social Security Dept.) to any person who, by reason of age, disability, or domestic circumstances is unable to earn a livelihood for himself and those dependent on him, and who is not eligible for any other monetary benefit. The amount is at the discretion of the commission.

Provision for O. A. P. in the Union of S. Africa is made by an Act of 1928, as amended in 1931 and 1937. It applies to white (European), persons, and to coloured persons (excluding Asiatics and aboriginal natives) of sixty-five years of age and over in the case of a man and sixty years of age and over in the case of a woman, domiciled and resident in the union, with means not exceeding a prescribed amount. The maximum amounts payable are £72 per annum to a white person, £36 to a coloured £30 to an Indian, £12 to a native. In 1948 white pensioners totalled 66,956, and received £4,206,180; coloured totalled 33,405, and received £410,198; Indians totalled 5008, and received £115,860. Provision for the payment of pensions to blind persons was made by an Act of 1936.

See W. H. Wickwar, *The Social Services: a Historical Survey*, 1936, and A. Wilson and G. S. Mackay, *Old Age Pensions: an Historical and Critical Study*, 1941.

Old Bailey, name of a street in the city of London, and commonly applied to the central criminal court (q.v.). The street, which is one of the most ancient parts of London, is situated in the city liberty of St. Sepulchre's and par. of Smithfield; but neither street nor court bears the slightest resemblance to the older street and tribunal of the same name. The district itself, even if ever to be associated with the horrors of public executions and the evidences of early notions of criminal justice, boasted trees and water some 750 years ago, at a time when the neighbourhood had even then for long been a place

of the dock and gallows. For we are told that in Cow Lane there was formerly a large pool called Smithfield Pond, or the Horse Pool, and to the S.W. of this stood the gallows or public place of execution, which with naïve irony was denominated the 'Elms,' from the great quantity of such trees growing in that neighbourhood. Smithfield's rural simplicities, however, soon yielded to streets and large wooden buildings, and the gallows were moved further W. The O. B. itself was, according to some antiquaries, a corruption of 'Balehill,' an eminence on which stood the bale or bailiff's house, wherein was held a court (called by Stow 'the court of the chamberlaine,' see *Survey of London*, 1603) for the trial of malefactors. These conjectures, however, introduce needless confusion, for the name merely indicates that the 'Old Bailey' stands in what was the 'bailey' of the city wall. The word 'bailey' would seem to be derived from O.F. *baillie*, palisade, enclosure, perhaps from the Med. Lat. form *ballium*, meaning the courts or wards of a castle formed by spaces between the circuits of defences surrounding the keep. The name 'bailey' in this context has been retained after the disappearance of the castle and its defences. Newgate became early the common jail for London and Middlesex, and the sessions at the O. B. have from time immemorial been held under the commission of jail delivery (q.v.) for Newgate, and of oyer and terminer (q.v.) for the city (see CENTRAL CRIMINAL COURT). Up to 1906 the sittings of the central criminal court were held in the old court-house, or the O. B., but a handsome new building designed by E. W. Mountford replaced the old premises in that year, and now occupies practically the whole site of what once was Newgate prison. The interior of the new court, which has sometimes and without regard to hist. been termed the New Bailey, is lofty and imposing, and over a great part of the vaulted ceilings are brilliantly coloured frescoes.

Old Believers, see RASKOLNIK.

Old Beni-Hassan, see BENI-HASSAN-IL-QADIM.

Oldbury, tn. of Worcester-shire, England, 5 m. W.N.W. of Birmingham, on the Birmingham canal. It has iron and steel industries, tube, chemical, aluminium, and brick and tile works. With Halesowen it forms a bor. constituency in Worcester-shire. Pop. 53,100.

Old Calabar, see CALABAR.

Old Castile, see CASTILLA LA VIEJA.

Oldcastle, Sir John, Lord Cobham (d. 1417), Eng. nobleman of Herefordshire, who helped to suppress the Welsh rising under Owen Glendower, and then fought for Henry IV. in France (1411). As a supporter of the Wyclifites or 'Lollards' he was condemned as a heretic by Archbishop Arundel (1413), but escaped to Wales. He was captured later and hanged and burnt. O. wrote *Twelve Conclusions*, and other works. He is supposed to be the original of Shakespeare's Falstaff. See J. Halliwell-Phillips on Shakespeare, 1855 65, and J. Galswiler and J. Spedding, *Studies*, 1881; also *Fas-*

ciculi Zizaniorum (Rolls Series); J. Foxe, *Acts and Monuments of the Church*, 1562, 1841; T. Gapey, *Life and Times of the good Lord Cobham*, 1843; and A. M. Brown, *The Leader of the Lollards: his Times and Trials*, 1848.

Old Catholics, section of the Rom. Catholic Church in Germany and Switzerland that first announced itself in Munich in 1870, upon the declaration of the dogma of the infallibility of the pope. The prime movers were Fr. Dollinger and Prof. Friedrich, supported by over forty profs. of the univ. The movement did not, however, develop to any considerable extent.

Old Colony State, see MASSACHUSETTS.

Old Contemptibles, name given to members of the original Brit. Expeditionary Force, which went to France in 1914.

Old Dominion, see VIRGINIA.

Oldenbarneveldt, Jan van (1547-1619), see BARNEVELDT.

Oldenburg, former grand duchy of N. Germany, and after 1918 a republic, consisting of three distinct and widely separated parts, viz. the prov. of O., the principality of Lübeck, and the principality of Birkenfeld. The collective area of these parts was 2482 sq. m., and the total pop. 82,000. O. now forms a gov. dist. of Lower Saxony, and is divided into Friesland, Weser-Marsch, Ammerland, Delmenhorst, O., Cloppenburg, and Vechta. The pop. in 1916 was 747,400. The prin. rivs. of O. are the Hunte, flowing into the Weser, and the Hase and Lehe flowing into the Ems. The country is flat, belonging to the great sandy plain of N. Germany. Agriculture, beer-brewing, and the rearing of cattle constitute the chief sources of wealth. There are numerous distilleries, breweries, and tanneries, and the manuf. of tobacco, bricks, and coils is carried on. O. (pop. 78,900) is the cap.

O. was a constitutional ducal monarchy, hereditary in the male line of the reigning family. The ter. was in fact, times occupied by the Teutonic race at the Chauci, who were subsequently merged with the more generally known Frisii, or Frisians. In 1180 the counts of O. and Delmenhorst succeeded in establishing independent states from the parts of Hurre the Lion, which fell into a condition of disorganisation after his downfall. This family continued to rule O. till 1918, giving, moreover, new dynasties to the kingdom of Denmark, the empire of Russia, and the kingdom of Sweden. See G. Rühmg, *Oldenburg's Geschichte*, 1911, and D. Kohl, *Oldenburg*, 1925.

Old English, see under ENGLISH LANGUAGE and ENGLISH LITERATURE.

Old English Sheep-dog ('Bobtail'), formerly much used, and developed to a high degree of intelligence, by shepherds and drovers in the S. cos. of England and Wales, but now a favourite show dog. The hard, shaggy coat should be free from curl, and have a dense waterproof undercoat. Its colour may be any shade of grey, grizzle, blue, or blue merle, with or without white markings. The head should be big and square with a long, strong jaw, black nose, and small eyes; the ears should

be small and covered with wavy hairs. The forelegs are straight, and the feet small and round. The body should be square and short and the hind quarters high and heavy. The tail ought to be absent in a fully grown dog, and puppies that are born with one should be docked when not more than four days old. Exercise for the breed is essential and no dog suffers more from being kept chained up. Many in this sort the great intelligence of



OLD & HIS NEW DOG.

types also occur if the birds are related and they are valued equally as stock or sport dogs or as companions and house dogs.

Old, or **Wine, English Terrier**—old terrier breed which after the Kennel Club's abolition of fighting became very rare. In spite of the fact that it is the only long terrier I could find the head should be long narrow and flat with a sharp tapering muzzle in scull jaw pronounced stop and ill-nose. The eye should be small and light set fairly close together the ears firmly quick, should be round and but the ribs long neck should be muscular the fore legs straight and the thighs comparatively large and muscular. The whip tail should be erect stiff. The coat must be close hard short upright and pure white colours such as blue not being favoured. The usual weight is between 10 and 15 lb.

Oldfield, Anne (1883-1970) actress, known as "Anne's" in the theatre, b. in London. She made her debut in 1900, and in 1916 played the part of Lady Lorry in *Modish in Fobber* at the *Hubbard*. She was the original representative of "Anne's" five characters in the play, and comedy, and soon came to be recognized as one of the most brilliant actors of the day. Her chief successes were in *Lady Towns*, *Sylvia*, *Mrs. Sullivan*, and *Sophisticate*. See E. J. Hobbs, *The Playhouse Days of Anne Oldfield*, 1890.

Oldfield, Josiah, M.D., dietician consulting physician and fruitarian at Shrewsbury, educated at Newjort Oxford St Bartholomew's, and Lincoln's Inn. He left a legal practice to take up medicine and founded the Humanitarian Hospital of St. Francis of which he was senior physician and chairman. In 1993 he took a similar post at the Lady Margaret

Fruitarian Hospital Having adopted the fruitarian diet he has pub many books and pamphlets including *Eat and Get Well*, *Eat and Keep*, *Young Healing* and *the Conquest of Pain*, *The Mystery of Birth*, and *The Mystery of Marriage*. He advocates the adoption of a fruitarian dietary for humane and asthetic reasons. In 1901 O founded the Society for the Abolition of Capital Punishment. During the First World War he raised and commanded a casualty clearing station and a field ambulance.

Old Forge, bor and township of Lackawanna co Pennsylvania U S A on Lackawanna R 1 m S W of Scranton Pop 11 800

"Old Glory," flag of the U S A formed of thirteen horizontal stripes alternately white and red and in the upper quarter next the staff a union of five pointed white stars on a blue field one for each state of the union

Oldham, pop. municipal and co. bor. of Lancashire, Eng., and 6 m. N.W. of Manchester. The town is mostly situated on a hill and its growth as a manufacturing centre gives it a modern appearance. This growth is principally due to the close proximity of the Lancashire coalfields and the extension of cotton manufactures dating from the latter half of the eighteenth century. It was incorporated as a bor. in 1847. Its main buildings are a town hall, Westminster hospital, an infirmary and museum, central free public library and blue coat school. The Alexandra park was opened in 1866. O. manufactures velvets, cords and uniforms. It has large foundries in china works and collieries in the near neighbourhood. It is one of the chief centres of the cotton spinning industry and textile machinery is made. It has efficient gas and electricity undertakings, an abundant supply of water and excellent transport facilities. There are numerous parks and recreation grounds and an excellent study centre. In addition to elementary and grammar schools there are well equipped technical, commercial and art schools. O. returns two members to Parliament. Pop. 120,500.

Old Monkland, see MONKLAND

Oldoway Man, human skeleton discovered towards the end of 1913 in the Rift valley by Dr Hans Reck of Berlin Univ at the N.W. end of Lake Kyauza in the Oldoway dist. of Tanganyika (then German East Africa) in deposits rich in fossil remains of a Pleistocene fauna. The country here bordering on Lake Kyauza and Lake Natron is parched scrubland but according to Sir Arthur Keith there is ample geological evidence from the fossil remains that this was not always the case. The Oldoway fossilised skeleton was found lying beneath 10 ft of intact strata and in such a position as seems to justify the inference that the man had become interred when Oldoway was a marsh of lake and that subsequently sedimentary deposits had formed over the body. The Munich anthropologists, T. L. Mollison and W. Grieser, described (1929) the O.M. as tall (5 ft 10 in.) powerful, long and narrow headed (20 in. min.) long faced

Sept., and a temp. of about 70°. The rest of the year a temp. of 60° and moderate watering are sufficient.

Olearia, genus of evergreen flowering shrubs, bearing in summer a profusion of daisy-like flowers as well as ornamental foliage. *O. haastii* is the New Zealand daisy bush, and is often grown on sunny borders and rockeries, especially near the sea. *O. myrsinoides*, with holly-like leaves and white and yellow flowers, is the hardiest species.

Olefant Gas, see ETHYLENE.

Olefins, in chem., a hydrocarbon of the ethylene series, having the general formula C_nH_{2n} . The simplest O. is ethylene itself, C_2H_4 . This was originally called olefant gas or oil-forming gas, since it readily combines with chlorine to form an oily liquid, ethylene dichloride, $C_2H_4Cl_2$, 'Dutch liquid.' The name O. is derived from olefant gas.

Oleic Acid, glyceride triolein acid, found in most natural vegetable and animal fats, the chemical compound being known as olein. A practically colourless oily liquid at ordinary temps., it becomes yellow and rancid when exposed to air and light.

Oleiro, see CUDGILERO.

Olenellus, fossil genus of trilobite, belonging to the Lower Cambrian and characterised by an elongated tail (pygidium) which was used to anchor the organism to the ground. See TRILOBITES.

Oleosa, see MULLER.

Oleograph, name given to a picture done in oil colors by a chromo-lithographic process, the print being mounted on canvas and varnished to imitate an original oil painting.

Oleomargarine, see MARGARINE.

Oleron, Isle of, is. of the Atlantic Ocean, off the S.W. coast of France, and part of the dept. of Charente-Maritime. Its maximum length is 13 m., breadth 7 m., and it covers an area of 66 sq. m. The surface is generally fertile, and it produces corn and wine. It has four towns, Le Château d'Oleron, St. Pierre, St. Georges, and St. Trojan-les-Bains. Pop. 15,100.

Oléron, Judgments of, code of maritime laws in use in W. Europe during the Middle Ages. It is said to have been originated by Eleanor of Guienne, wife of Henry II. of England, towards the middle of the twelfth century, at O., part of the duchy of Aquitaine, which came into the possession of the Fr. Crown in 1570, and to have been introduced into England in the reign of Richard I., with some amendments and additions. See SEA LAWS.

Olfactory Nerve, see NERVOUS SYSTEM, Cranial Nerves; NOSE.

Oiga, St. (c. 890-969), wife of Igor, prince of Kiev. On his death in 945 she ruled as regent for her son Sviatoslav. In 958 she was baptised at Constantinople, and was after her death canonised in the Gk. Orthodox Church, her commemoration day being July 11. She made great, but unsuccessful, efforts to introduce Christianity into Russia, a task achieved by St. Vladimir, her grandson.

Olhão, seaport of Portugal, in Faro prov., 6 m. E. of Faro. There are noted

sardine fisheries and canneries. Pop. 14,500.

Oliaros, see ANTIPAROS.

Olibanum (Gk. *ἄλαβω*, frankincense), gum-resin yielded by various species of the genus *Boswellia*, found in Somaliland.

Oligarchy (Gk. *ὀλιγαρχία*), 'the government of the few,' was the name given to that form of constitution amongst the ancients, where a portion of the community were in possession of power, e.g. the govts. of Thebes, Megara, and Corinth. In ancient times, although it was acknowledged that an 'aristocracy' often developed into an O., the two were distinguished, 'O.' signifying the government of the wealthy, who were looked upon as directing their efforts towards their own aggrandisement and the maintenance of their own power and privileges, while 'aristocracy' meant the rule of the best people for the public good.

Oligocene System, geological epoch which elapsed between Eocene and Miocene time. In Britain the O. formations are only met with in the Hampshire basin, where they consist of thin-bedded sandstones, clays, marls, and limestones, known collectively as a fluvo-marine series. They are subdivided into the Henden, Osborne, Benbridge, and Hamstead beds. The subdivisions, lower, middle, and upper, of the O. in France, Belgium, Switzerland, and N. Italy, have been named after places of typical development, as Turgian (from Turgos), Stampian (after Etampes), and Aquitanian (Aquitania) respectively. In the Paris basin the system is represented by lacustrine marls with the gypsum of Montmartre forming the lower O., followed by lacustrine and marine marls. The highest beds are the sandstones of Fontainebleau and the fresh-water limestones of Orleans (Beauce). The Gr. O. are remarkable for their deposits of lignite and brown coal. In N. America the Vicksburg beds (orbitalitic) occurring in Alabama and Florida, the White River beds of S. Dakota, and the Red Bluff of the Mississippi dist., are of O. age.

Oliphant, Mrs. Margaret, *née* Wilson (1828-97), Scottish authoress, b. at Wallyford, near Musselburgh. She produced her first novel, *Passions in the Life of Mrs. Margaret Unland*, in 1849, following this by *Cuth Fuld* and *Merkland* in 1851. The last named met with such great success that on coming to London in 1852 she was invited to contribute to *Blackwood's Magazine*, contributing from that date until her death over 200 stories and articles. She wrote *Katie Stewart* (1853); *Quiet Heart* (1854); *Zulee* (1856); and *The Athelings* (1857). Previous to this, she had, in 1852, married her cousin, Frank Wilson O., who was an artist in stained glass. She wrote in all about 100 books, the best known of which are (fiction) *Memoirs and Resolutions of Adam Graeme of Mossgrange* (1852); *Miss Marjoribanks* (1866); *Whitladies* (1875); *Eglie Ogilvie* (1886); *The Marriage of Elionor* (1892); and her biographies of R. B. Sheridan (1883); Edward Irving (1886); and Laurence O. (1891). See Mrs. A. L. Coghill, *The Autobiography and Letters of Mrs. Oliphant*,

1899, and Lady Anne Ritchie. *From the Porch*, 1913.

Oliva: 1. Tn. of Spain in the prov. of Valencia. 40 m. S.S.E. of Valencia. It contains an anc. palace and manufs. linen cloth. Pop. 8000. 2. Mkt. tn. of Poland, 4 m. N.W. of Danzig. Pop. 6000.

Olive (*Olea europaea*), slow-growing tree, with undivided leaves and axillary clusters of green flowers followed by pendulous, lustrous, blue-black oily fruits. While green and unripe, the fruits are bottled or pickled in brine. O. oil is extracted by pressure from ripe fruit. The tree has been cultivated since a remote period, especially on the borders of the Mediterranean Sea, and the cultivated forms exhibit great improvement in the size and oiliness of the fruits compared with the tree in its wild state. The wood is soft, but takes a high polish, and is used for making small fancy articles.

Olive Branch Petition, final effort made by the Amer. colonists in 1775 to conciliate the Eng. Gov., after the outbreak of hostilities in the war of Amer. Independence. The petition was not allowed to be presented, and the only answer given to the appeal was a large increase of land and sea force in the declaration in Parliament to take stern measures against the 'conspirators and insurgents' in America.

Oliveira Martins, Joaquim Pedro de (1815-94), Portuguese historian, b. at Lisbon. He began life as an engineer, but he fore very long devoted himself to literature. Elected to Parliament in 1886, he held a succession of posts in the gov., including that of finance minister in the crisis of 1892, but resigned in the same year. His many works include *Historia da Civilização Iberica* (trans. *A History of Iberian Civilisation*) (1879); *Historia de Portugal* (1879); *O Brazil e as Colonias portuguesas* (1880); *Historia de Republica Romana* (1885); *Os filhos de João I.* (trans. *The Golden Age of Prince Henry the Navigator*, 1891); *A Inglaterra da hoje* (trans. *The England of To-day*, 1893); *Cartas consulares* (posthumous, 1894); and *O Principe perfeito* (posthumous, 1896).

Olivento, olive-green coloured hydrous arsenate of copper with phosphorus. It occurs in orthorhombic prisms, but is also found fibrous and globular or earthy (h. 3, sp. gr. 1.4). The crystalline variety is found in Cornwall and Devon, and at Alston Moor in Cumberland. It has a vitreous lustre and breaks with a conchoidal fracture. The fibrous variety is also called wood-copper or wood-arsenate.

Olive Oil, fixed oil expressed from the fruit of the O.-tree, *Olea europaea*, of the natural order Oleaceae. The O.-tree has been cultivated from the earliest times in Greece, Italy, S. Spain, Asia Minor, and other Mediterranean countries, and has been introduced into Mexico, Chile, Peru, the S. States of America, Australia, China, S. Africa, etc., though the chief supply of the oil still comes from the Mediterranean coasts. The fruit is pressed to a pasty consistency, enclosed in woollen bags, and subjected to considerable pressure. This yields oil of the first quality; second and

third grades are yielded by subsequent pressings. O. O. is used for culinary purposes; for the toilet; in medicine as a laxative, a nutritive food, an emollient in external applications, etc.; and in the arts for the manuf. of soap, etc. It consists chiefly of olein and palmitin.

Olive, Princess, title assumed by Mrs. Olivia Serres (q.v.).

Olive, see ROLAND.

Olive, George, see OXIONS, OLIVER.

Olive, Isaac (c. 1556-1617), miniature painter, probably b. in England, and though of Fr. origin, was regarded by his contemporaries as an Englishman. He painted many portraits, and was exceedingly expert in his miniatures. Among his works are the portraits of James I. and his family, Sir Philip Sidney, and the family of Sir Kenelm Digby.

Olives, Mount of, called also Mt. Olivet, is only once mentioned by this name in the O.T. (Zech. xiv. 1), though it is elsewhere spoken of under other titles. The Arabic name is Jebel al-Tur. It is situated to the E. of Jerusalem, from which it is separated by the valley of the Kidron or valley of Jehoshaphat. The name is frequently applied to the range of hills of which it forms one. To its N. is the Scopus, the site of the encampment of the Romans under Titus. The 'Prophets' is a hill to the S. of Olivet proper, and the outlying spur of the range to the S. is known as the Mt. of Offence. The M. of O. is connected intimately with the life of Jesus, for on the W. slope lay the Garden of Gethsemane. The M. of O. is 2680 ft. above sea level, and on its summit are many churches and convents, the most anc. being the small octagonal church of the Ascension (fifth century). Others are the Orthodox convent of Galilee; a modern Russian convent with a conspicuous view-tower, and the church of the Paternoster, this last being a Ger. Protestant hospice built by William II. in 1910, and used as the gov. house by the Palestine administration up to 1927, when an earthquake rendered it uninhabitable. See works on Syria, Palestine, and Jerusalem by A. P. Stanley, J. L. Porter, W. McO. Thomson, Barclay, etc. (See Illustration, p. 116.)

Olivier, Sir Laurence Kerr (b. 1907), Eng. actor, producer, and manager, b. at Borking, son of the Rev. G. K. Olivier. He was educated at St. Edward's School, Oxford. First appeared on the public stage as Katherine in *The Taming of the Shrew* in a special boys' performance at the 1922 Stratford Shakespeare Festival. In the next seven years he toured in plays and sketches with Ruby Miller and Lena Ashwell, and spent three years in the Birmingham Repertory Company. His performance for the Stage Society as Stanhope in *Journey's End* heralded his long line of professional leading parts, the most celebrated of which have been Hamlet (*id. Vic.*, 1937); Romeo (1939); and Richard III. (1948). He has played in America (first in 1929), toured the Continent (1945), and Australia (1948). He has made many films, two of which he also produced and directed: the prizewinning *Henry V.* and *Hamlet*. In 1930 he married

Jill Esmond who obtained a divorce in 1940, his second wife Vivien Leigh played Juliet to his Romeo in his 1939 production. During the Second World War he was a lieutenant in the Fleet Air Arm but was released in 1941 to co-direct the Old Vic Theatre Company with John Burrell and Ralph Richardson at the New Theatre. He was knighted in 1947.

Olivier of Ramsden, Sydney Olivier, first Baron (1859-1945) English statesman, colonial administrator and writer, son of a clergyman. Educated at Lausanne, Tonbridge School and Corpus Christi College, Oxford, he entered the Colonial Office in 1882, and thereafter held a succession of

closed pot and is always very highly seasoned with pepper and garlic. Compare the *Fr. pot pourri* and the Scottish hotch potch.

Olmütz, see Oromotz

Olmütz, Convention of Austro-Prussian agreement of 1850 by which (after the upheavals of 1848-9) the influence of Austria in Germany was revived at the expense of Prussia. (1) the latter the convention was known as the humiliation of Olmütz.

Olney, Richard (1803-1877) American statesman and lawyer, born at Oxford, Massachusetts. In 1833 he was attorney general of the U.S.A. In 1857 he became



THE MOUNT OF OLIVUS

important posts, secretary to the W. India Royal Commission 1857, colonial secretary, Jamaica 1859-1864, governor of Jamaica 1907-13, permanent secretary of the Board of Agriculture 1913-17, K.C.M.G. 1907. He was created Baron in 1924. He took office as secretary of state for India 1924 under the first Labour Gov. O. was secretary of the Fabian Society from 1886 to 1890 and held advanced views especially on colonial policy. Among his pub's were *White Capital and Coloured Labour* (1906), *The Anatomy of African Missions* (1927), *The Myth of Governor Lyr* (1933) and *Jamaica the Blessed Isle* (1936) a standard work. See *Sydney Olivier: Letters and Selected Writings* with a Memoir by Margaret O. 1948.

Olivine, see CHRYSOTILITE IGNEOUS ROCKS

Olla podrida (literally, putrid pot), so called from its miscellaneous contents, is a stew made of meat, fish, poultry, vegetables, and other ingredients very common in Spain. It is cooked in a

secretary of state in President Cleveland's Cabinet. He drafted the famous message of 1895 insisting that Great Britain must submit to arbitration the long-standing boundary dispute between Venezuela and British Guiana. O. retired in 1897.

Olney 1 In of Buckinghamshire on the Ouse. 2 In of Kent. 3 In of London. 4 In of Essex the poet was a resident from 1767 to 1786 and the house he lived in contains various relics still extant. Pop. 2700. 5 City and co. seat of Richmond, Ill., Illinois, U.S.A. There are various manors. Pop. 7800.

Olomouc (or Olmütz) In of Moravia (Czechoslovakia) on an is. of the R. Morava and formerly a fortress of great strength. O. is the seat of an archbishop. The most noteworthy edifices are the cathedral, a fine old building and the church of St. Mauritius, completed in 1412 with its celebrated organ. The noble town hall (1774) the lofty column on the Oberring, six fine fountains in the squares and the splendid archiepiscopal palace and chapter house all contribute

towards the picturesque aspect for which O. is distinguished. Beer, malt, sugar, and starch are manufactured. Pop. 62,500.

Oloron, see ERYMANTHUS.

Oloron, or **Oloron-Sainte-Marie**, tn. of France, in the dept. of Basses-Pyrénées, on the Gave d'Oloron, 15 m. S.W. of Pau. Its church of Ste Marie is in the transition style from Romanesque to Gothic. It manufs. flour, leather, and woollen goods. Pop. 10,500.

Olowa (Ger. **Ohlau**), tn. of Poland in lower Silesia, on the O., 16 m. S.E. of Wrocław (Breslau). Pop. 3000.

Olzstyn, see ALLSTSTEIN.

Olten, tn. of Switzerland, in the canton Solothurn, on the R. Aar. It is a railway junction, with workshops, and has manufs. of iron, wire, linen, cotton, and shoes. It has also a central book-trade supply depot for the publishers of Switzerland. Pop. 13,000.

Olenitza, tn. of Rumania, 35 m. S.E. of Bucharest, on the L. B. of the Danube, at the confluence of the Argesul. It is a riv.-port. Pop. 10,400.

Olts Missou, see BWA LAKE.

Olympia (Ὀλύμπια): 1. Name given to a plain which contained the temple and sacred grove of Zeus Olympius, situated in the Peloponnesian dist. Pisatis, belonging to the Eleans, at the point where the Cladeus runs into the Alpheus. It was of great importance from very early times. Besides the temple of Zeus Olympius, there were sev. sacred edifices and other public buildings in the sacred grove and its immediate neighbourhood. The grove itself (ἡ Ἄαρις), which is described by Pindar as being well wooded, was bounded on the W. by the Cladeus, on the S. by the Alpheus, and on the E. by the Stadium. In the centre was a grove of planes, and the whole Altis was surrounded by a wall (said to be the work of Hercules) in which were sev. gates; the most important being the Pompe Entrance in the middle of the W. side, through which all the processions passed. To the right of this entrance stood the Olympium, or the temple of Zeus Olympius, a magnificent building, designed by the architect Libon of Elis, and second only to the Parthenon. The temple contained the 'Cyllistephanus,' or wild olive tree, which furnished the garlands of the Olympic victors. In front of the Hieron and Pelopon, and equidistant from both, was the Great Altar of Zeus (22 ft. high), and between the altar and the temple of Zeus stood the Column of Phœbus. Besides those already mentioned there were the stadium and the hippodrome. These two formed the place of exhibition for all the Olympic contests, and probably formed a continuous area from the circular end of the stadium to the further extremity of the hippodrome. The stadium, which was about 210 yds. long, was used chiefly for foot races, and had two entrances, the Pompe and the Secret, the latter being only used by the Hellanodict or judges, while the hippodrome was used for chariot races and horse races. 2. City, cap. of the state of Washington, U.S.A., on Budds Inlet, about 50 m. from

Seattle. It contains the capitol, a magnificent edifice built in native sandstone, in which is the state library. The chief industry is lumbering, but fishing and mining are also carried on; water power is supplied from the Doschutes R. Pop. 12,000.

Olympiad, period of four years between each celebration of the Olympic Games. 776 B.C. was reputed to be the first year of the first O. O. began to be reckoned from the victory of Coræbus (776 B.C.), the first victor in the games after their suspension for eighty-six years; but Timæus of Sicily, who placed it 261 B.C., was the first writer who regularly arranged events according to the conquerors in each O. His practice was followed by Polybius, Diodorus Siculus, Dionysius of Halicarnassus, and others, but the last O. ended A.D. 394, for the Olympic Games were abolished in that year during the reign of Theodosius the Great. For converting O. into years B.C., multiply the number of O. that have actually elapsed by four, and deduct the number th. is obtained from 780. For converting O. into years A.D., go through the same process as before, but subtract 780 from the number obtained by multiplication. But seeing that the Olympic Games (q.v.) were celebrated about mid-summer, and that the Attic year began at about the same time, it is necessary to reduce the year B.C. by one if an event happened in the second half of the year. The method of calculation by O. was, however, only used for literary purposes, and never adopted in everyday life.

Olympias (d. 316 B.C.), wife of Philip II. of Macedonia, and the mother of Alexander the Great, was the daughter of Neoptolemus I., king of Epirus. Philip, on account of disagreements, separated from her and married Cleopatra. She left him to live with her brother Alexander, king of Epirus, whence she contrived the death of her husband. She returned to Macedonia on the accession of her son Alexander; but during his absence she caused great trouble to the regent Antipater, and on the death of her son in 323 B.C. was forced to retire again to Epirus. Here she remained until 317, when she became for a short time mistress of Macedonia; but she was forced to surrender eventually to Cassander, Antipater's son, and being condemned without a hearing, was put to death in 316 B.C.

Olympic Games. *The Ancient Greek Games*.—The O. (or Olympian) G., the chief national festival of the Gks., were held once every four years and were celebrated in honour of Zeus. They occupied five days, and consisted of two parts: the presentation of offerings, and the contests. At first the contest consisted of a simple running match held in the stadium, but about 724 B.C. the *diaulos*, or double course, was introduced, in which the runners had to make a circuit of the goal and return to the starting-point. Later came the *dolichos*, or long race, and in 708 B.C. the *pentathlon* was introduced, a five-fold contest, consisting of leaping, running, throwing the quoit, wrestling, and

80-metres hurdles; high jump; long jump; weight; discus; javelin. Other contests were basket ball; boxing, of various weights; canoeing, over sev. distances; cycling, over sev. distances; equestrian, of sev. types; fencing, individual and team, with épée, foil, or sabre; Association football; gymnastics, individual and team; hockey; rowing, sculls, pairs, fours, and eights; a modern pentathlon, comprising riding, fencing, shooting, swimming, and running; shooting, with pistol and rifle; swimming; diving; water polo; weight lifting; wrestling, free style and Greco-Rom.; and vaulting. The women's 200 metres, long jump, and weight, were new events. New Olympic records were estab. as follows: men's 800 metres, M. Whitfield (U.S.A.), 1 min. 19.2 sec.; men's 5000 metres, G. Roeff (Belgium), 14 min. 17.6 sec.; men's 10,000 metres, E. Zatopek (Czechoslovakia), 29 min. 59.6 sec.; 10,000 metres walk, J. F. Mikaelson (Sweden), 15 min. 13.2 sec.; men's weight, W. M. Thompson (U.S.A.), 56 ft. 2 in.; men's discus, A. Consolini (Italy), 173 ft. 2 in.; men's 110-metres hurdles, W. F. Porter (U.S.A.), 13.9 sec.; men's 100-metres hurdles, R. B. Cochran (U.S.A.), 51.1 sec.; women's 80-metres hurdles, E. E. Blankers-Koen (Netherlands), 11.2 sec.; women's high jump, A. Coachman (U.S.A.), 5 ft. 6 in.; women's javelin, H. Bauma (Austria), 149 ft. 6 in.; modern pentathlon, Capt. W. Grut (Sweden), 16 points; men's 100-metres free-style swimming, W. Rie (U.S.A.), 57.5 sec.; men's 200-metres breast-stroke swimming, J. Verdeur (U.S.A.), 2 min. 39.3 sec.; men's 100-metres free-style swimming, W. Smith (U.S.A.), 1 min. 11.0 sec.; men's 500-metres relay swimming, U.S.A., 8 min. 16.0 sec.; women's 200-metres breast-stroke swimming, N. van Nhet (Netherlands), 2 min. 57.2 sec.; women's 100-metres free-style swimming, A. Curtis (U.S.A.), 5 min. 17.8 sec.; women's 100 metres back-stroke, K. Harup (Denmark), 1 min. 14.4 sec.; women's 100-metres swimming relay, U.S.A., 1 min. 29.2 sec.; feather weight lifting, M. Fayad (Egypt), 732½ lb.; light-weight lifting, I. Shams (Egypt), 793½ lb.; middle-weight lifting, F. Spellman (U.S.A.), 839½ lb.; light heavy-weight lifting, S. A. Stanczyk (U.S.A.), 920 lb.; heavy-weight lifting, A. Davis (U.S.A.), 997½ lb. In the men's 100-metres race, A. S. Wint (Jamaica) equalled the Olympic record at 16.2 sec.

A winter-sports pentathlon was held at St. Moritz, Switzerland, in 1948, twenty-eight nations sending nearly 1000 competitors. The thirteenth Olympiad is planned to be held at Helsinki in 1952.

The games are controlled by the International Olympic Committee, on which about fifty nations are represented. The equipping of each team is the work of the national committee, i.e. in Great Britain, of the Brit. Olympic Association. See also *ATHLETICS*. See F. A. M. Webster, *The Evolution of Olympic Games, 1914, and Olympic Cavalcade, 1948*.

Olympiodorus, names of two philosophers of the Neoplatonic school, natives of Alexandria. O. the elder (fifth cen-

tury A.D.) was teacher of Proclus. Of the writings of O. the younger (sixth century A.D.) are extant a life of Pluto, an attack on Strabo, and scholia on the *Phaedo*, *Alcibiades I.*, *Philebus*, and *Gorgias*.

Olympus, anc. name of sev. chains of mts. The most famous (now called Elymbos) was on the frontiers of Thessaly and Macedonia. Its highest peak of 9751 ft. above the sea level, and is snow-capped for nine months of the year. O. was regarded by the Gks. as the abode of the gods, and as having the palace of Zeus at its summit.

Olynthus, anc. tn. of Chalcidice, and the most important of the Gk. cities on the coast of Macedonia. It was at the head of a confederacy of all the Gk. tns. in its neighbourhood, and maintained its independence, except for a short interval when it was subject to Sparta, till it was taken and destroyed by Philip (347 B.C.). The Olynthian orations of Demosthenes urged Athenians to send assistance to the city when it was attacked by Philip.

Olyphant, coal-mining tn. of Lackawanna co., Pennsylvania, U.S.A., on the Lackawanna R. Pop. 9200.

Omaeati, Mexican god of joy and festivity (the name signifies 'two roads'). He was worshipped only by those who came under his direct influence, i.e. the rich who could render homage to him in splendid banquets. The idea of communion which appears to have justified the religious feasts of the Mexians was apparently present in these banquets to the Mexican Bacchus.

Omagh, mkt. tn., cap. of co. Tyrone, N. Ireland, on the Strule. Its castle (now in ruins) was besieged in 1509 and 1641. Milling and shirt manufs. are carried on. Pop. 6000.

Omaha, co. seat of Douglas co. and chief commercial city of the State of Nebraska, U.S.A., is on the r.b. of the Missouri R., 20 m. N. of the mouth of the Nebraska R. The city is well built on the sloping banks of the riv., and has many fine edifices, including the Creighton and O. Univs., the court house, and the Coliseum. It is an important railway centre, with an airport, and has extensive manufs. of machinery, insect oil and white lead, with brewing and distilling. Smelting of zinc, lead, copper, gold, and silver is carried on, and slaughtering and meat-packing are thriving industries. S. Omaha, formerly a separate city, was incorporated with O. in 1911. Pop. 223,800.

Omaha Beach, code-name of the stretch of beach from the Vire R. to Port-en-Bessin, where the U.S. 5th Corps landed on D-Day 1944, in the Second World War.

Omahas, tribe of N. Amer. Indians, who inhabit a reservation in E. Nebraska, U.S.A. They are of Sioux stock, and originally dwelt in Minnesota.

Oman, Sir Charles William Chadwick (1860-1946), Eng. historian, b. at Muzafarpur, Indin. In 1883 he was made a fellow of All Souls College. In 1905 a member of the Brit. Academy and Chichele prof. of modern hist. at Oxford, retiring from the latter post in 1946. Conservative

M.P., Oxford Univ., 1919-35, he was made K.B.E. in 1920. From 1917 to 1921 he was president of the Royal Historical Society, and in 1927 president of the Royal Archaeological Institute. A specialist in military hist., among his writings are *A History of Greece* (1888); *A Short History of England* (1895); *A History of the Art of War in the Middle Ages* (1898, 1921); *A History of the Peninsular War* (1902-11), a work of the greatest authority; *A History of England before the Norman Conquest* (1910); *Castles* (1926); *Napoleonic Studies* (1929); *A History of the Art of War in the Sixteenth Century* (1937); and *On the Writing of History* (1939). His daughter Carola (b. 1897) is also a historian, well known for her life of Nelson (1917).

Oman (and **Muscat**), independent sultanate in the most E. portion of Arabia, consisting of a strip of maritime ter., bounded on the N.E. by the gulf of O. and on the S.W. by the deserts of the interior. Inland the sultanate extends to the fringes of the Nub' al Khali desert. Area 82,000 sq. m. At a distance of from 20 to 40 m. from the coast a chain of mts. runs parallel to it, which reaches in its highest ridge (called Jebel Akhdar), an elevation of nearly 3000 ft. There are some fertile tracts, but the greater part is a waste of sand. The Umm al Samin quicksands, skirting the E. of the Drua, is a vast swamp running N.W. to S.E. for 90 m., and is about 45 m. at its broadest. The coastline between Muscat and the prov. of Dhofar is barren and forbidding.

Dhofar is a fertile prov., of which the chief ts. are Salalah and Murba. The chief products are pearls, dates, sugar cane, and fruit. Trade is mainly in the hands of the Indians, some of whom are Brit. subjects. Rice, sugar, and coffee are the chief imports. There are no industries of any importance. Muscat is the chief port (pop. 4500). Matrah is the starting point for trade routes inland. Other ts. are Kalba, Hagar, and Boher. A new treaty of commerce and navigation between Britain and the sultan was concluded in 1939. The pop. is estimated at 1,500,000.

Oman, Gulf of, extension of the Arabian Sea to the N.W., between Makran (Persia) and O. It leads to the Persian Gulf through the strait of Ormuz, and has a width of 200 m. at its entrance.

Onar (d. 614), Moslem caliph from 631 to 644. He subdued Egypt, Palestine, and Syria, and defeated the Persians, and was the first to have the title of Commander of the Faithful. He introduced the new Arabian calendar. See also OMAR, MOSQUE OF.

Omar, iv., of W. Siberia see OB.

Omar Khayyám (c. 1031-c. 1130), Persian poet, mathematician, and astronomer, b. at Nishapur, the cap. of Khorezm. He was a pupil of Imám Mu'allik, an aged Sunni teacher. O. K. revised the calendar under the sultanate of Malik Shah, and became famous throughout the E. as a mathematician; a work on algebra was known in Europe. His name is now inseparably connected with the *Rubáiyát*,

a long poem in quatrains, forming a medley of love and tavern songs, tinged with Sufi mysticism and with the melancholy of E. fatalism. A trans., or rather a paraphrase, of this poem was pub. in Eng. by Edward Fitz-Gerald in 1859. The authenticity of many of the quatrains has been questioned. See F. Wepke, *L'Alphabet d'Omar Alkayyám*, 1851; Heron-Allen, *Facsimile of the Manuscript in the Bodleian Library*, 1898; eds. of the *Rubáiyát* by Winfield (who pub. a new Eng. version in 1882 and 'the first critical version of the text' in 1883) and John Payne, the poet, who produced another trans. in 1898; Bjerrgaard, *Sufi Interpretations of the Quatrains of Omar Khayyám*, 1902; life by J. K. M. Shirazi, 1905; O. Rothheld, *Omar Khayyám and his Age*, 1923; A. G. Potter, *Bibliography of the Rubáiyát of Omar Khayyám* (eds. in foreign languages), 1929; essay by L. Housman and biography of Fitz-Gerald by G. F. Munro in Collins's ed. of *The Rubáiyát*, 1947.

Omar, Mosque of, or Dome of the Rock, mosque in Jerusalem on the supposed site of Mohammad's ascent to Heaven, or, from the Jewish point of view, of the uncompleted sacrifice of Isaac. It was built by O. (d. 644), the second successor of the prophet. See also MOSQUE.

Ombre, or 'The Man,' game of cards in vogue by the Spaniards. It is played by three persons with a pack of forty cards, the 8, 9, and 10 being dispensed with, and each player is dealt nine cards by threes. Each deal constitutes a game, and one hand plays against the other two, the solo player being called the 'O.' The game is described by Pope in his *Rape of the Lock*.

Omdurman, tr. of the Anglo-Egyptian Sudan; is on the l. b. of the Nile, facing Khartoum. It is a trading centre and a pilgrim's resting place, and was the chief tn. during the regime of the Mahdi. On Sept. 2, 1898, Brit. forces under Kitchener, advancing up the Nile after the victory at Atbara, encountered the forces of the Khalifa. During the battle the 21st Lancers delivered the last full-scale cavalry charge of modern warfare. Anglo-Egyptian losses were about 500; the Dervish casualties amounted to 10,000, as well as 5000 prisoners. Winston S. Churchill took part in the cavalry charge, and describes the operations in *The River War*, 1899. Pop. 116,100.

O'Meara, Barry Edward (1786-1836), Irish surgeon to Napoleon in St. Helena. He entered the army in 1801 as assistant-surgeon, served in Sicily and Calabria, and in 1807 went with Gen. Fraser to Egypt, but was dismissed from the army the same year for participating in a duel. After this he served as a naval surgeon, and in 1815 accompanied Napoleon to St. Helena. Here he remained for three years, but being accused by Lowe of intriguing with Napoleon, was recalled. He pub. *Napoleon in Exile* (1822), in which he attacked Sir Hudson Lowe's treatment of Napoleon, and *Observations upon the Authenticity of Bourrienne's 'Mémoires'*. He has been eulogised as 'the stiff surgeon' by Byron in his *Age of Irony*.

Omelet (the anglicised form of Fr. *omelette*) is a kind of thin pancake. It is made with eggs beaten up lightly, with the addition of milk, herbs, flour, cheese, mushrooms, ham, bacon, fish, or game, and salt and pepper for seasoning, according to the requirements, and cooked in a buttered pan. For sweet O.s. sugar is used instead of pepper, and fruit added.

Omen, name applied by the ancients to signs which were supposed to indicate good or bad fortune, e.g. the appearance of snakes, the flight of birds. See AT GUR; DIVINATION; ORACLE.

Omer, Saint (c. 595-c. 670), Fr. bishop, b. in the ter. of Constance, became a monk at Luxeuil. Later he became bishop of Thérouanne, his see including the present Pas-de-Calais and Flanders, in Belgic Gaul. To propagate the faith St. O. enlisted many monks, and a great number of abbeys were built. The saint himself was the co-founder of Sithin, and round this abbey grew up the tn. now known as St. O.

Omer, St. (France), see ST. OMER.

Omis, port of Dalmatia, Yugoslavia, 12 m. S.E. of Split (Spalato), is noted for muscatel wine. Pop. 16,000.

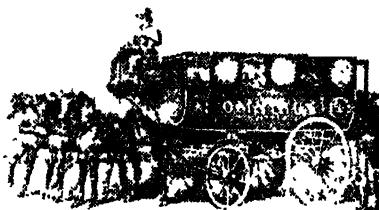
Ommanney, Sir Erasmus (1814-1904), Brit. admiral, b. in London. He took part in the battle of Navarino (1827), for which he received a medal. He discovered the first traces of the fate of Sir John Franklin in 1850, and for his scientific researches he received the Arctic medal, 1851, was made F.R.S. in 1865, and knighted 1877, being advanced to admiral the same year.

Ommiads, see OMAYYADS.

Omayyads, Arabian family of Mecca, the first Arabian caliph dynasty, founded by Muawiyah, 661-80. Under them the Arab realm extended to China and Spain. Between 756 and 1031 their empire still included the independent caliphate of Cordova in Spain. See CALIPH.

Omnibus (Lat. 'for all'), name of a public conveyance which has undergone considerable modifications from its early form. The forerunner of the O. was the vehicle that made journeys in Paris from March 18, 1662, going at fixed hours, and with a fixed charge of five sous, but as this was only 'pour la plus grande commodité et liberté des personnes de mérite,' and soldiers, pages, lackeys, etc., were forbidden, it was not, strictly speaking, an O. The present system, by which no one is excluded, was begun in the time of Charles X.; the first O. to run in London was that started in 1829 by M. G. Shillibeer, which ran from the 'Yorkshire Stingo' at Paddington to the Bank, at a fare of one shilling. These early O.s., or 'buses,' as they were soon termed for convenience, were drawn by three horses abreast, and carried twenty-two inside passengers. They were later superseded by smaller vehicles, which carried twelve inside passengers. Outside seats along the centre of the roof were the next improvement. Many of the larger tns. of the United Kingdom followed London's example in the matter of horse O.s. The London General Omnibus Company, which was founded in 1856 as *La Compagnie Générale des Omnibus de Lon-*

dres, became the largest of such companies, though the London Road Car Co. (which introduced the use of tickets) was at one time powerful. The first 'double-decked' motor bus was licensed by the police in 1904, and the last horse buses disappeared seven years later. The motor buses of the metropolis were taken over in 1933-35 by the London Passenger Transport Board (g.r.), which became the London Transport Executive in 1948. The latest type of bus is luxuriously upholstered and offers a considerable measure of comfort and silence. All prov. tns. have services, and the O. has become a link in the



SHILLIBEER'S BUS OF 1824

local and long-distance transport services of most countries. After the 1930s motor buses (see ELÉPHANT TRACTION), replaced trams in many tns.

O'Morgar, Malachy, see MALACHY, ST.

Omotski, see IMOSHI.

Omphale, Gk. mythology, the masculine, but attractive queen of Lydia, to whom Heracles was bound a slave for three years. He became enamoured of her, and led an effeminate life spinning wool, while O. wore the lion's skin and was lady paramount.

Omphalodes, genus of annuals and perennials (family Boraginaceae), bearing racemes of white or blue flowers. *O. infolia* (Venus's navelwort) is a white flowered ann., often grown in garden borders. *O. Lucilia* (rock N.) is a blue-flowered perennial of considerable value in the rock garden. The plants prefer a partly shaded position.

Omphalopsychol, see HESYCHASTS.

Omsk, tn. of the R.S.F.S.R., cap. of the region of the same name, s and at the confluence of the Om and the Irtysh. It is situated at the junction of highways to Chkalow (Orenburg), E Siberia, and Turkistan, whilst steamers run to Tobolsk and Semipalatinsk. The prin. public buildings are the cathedral, the former governor-general's palace, and the fortress; there is an agric. institute and a medical school. The seat of the W. Siberia Geographical Society is also here. It is a trade centre, and industries include brick and pottery making, brewing and distilling, and the manu. of silk, tobacco, oil, and soap. Near the tn., in the wooded

steppe, there is a state cattle farm, which occupies some 12,000 ac. Pop. 280,800.

On, see Heliopolis.

Onager, or *Equus onager*, species of mammal in the family Equidae, is the best-known wild ass of Asia (it is now included in the subgenus *Isinus*). It occurs in the steppes of W. and central Asia, and so closely resembles *E. hemippus* of Syria (which was considered specifically distinct by Geoffrey St. Hilaire) that it is thought probable they belong to the same species. The O. is a swift-footed animal, sandy in colour but with a dark stripe running down its back.

Onagraceae, family of herbs and shrubs bearing red, white, yellow, blue, or purple axillary or terminal flowers, and opposite or alternate simple leaves. *Enothera* and *Fuchsia* are among the genera.

Onamuchi, see OMONAMUCHI.

Onas, see under FUGIANS.

Onatas of Aegina, Gk. sculptor (bronze and statuary) who flourished in the middle of the fifth century B.C.

Ondes Musicales, electrophonic instrument invented by Maurice Martenot of Paris in 1929. It produces notes from the air graded according to the chromatic scale by a special device. It has a warbling note, which keeps in tune with the other orchestral instruments. Honegger used the O. M. in his *Jeune d'Arc*.

Onega: 1. The seaport of the Archangel Region of the R.S.F.S.R., 90 m. S.W. of Archangel. It lies at the mouth of the O. R., at the head of O. Bay, an inlet of the White Sea. The inhab. are mostly occupied in the timber trade, but fishing is also engaged in. Pop. 5000. 2. Lake in the N. of Russia, lying partly in the Leningrad Region and partly in the Karelo-Finnish S.S.R. After Ladoga, the largest lake in Europe, it is 59 m. in greatest breadth, and about 150 m. in length. Area 3800 sq. m. Its only outlet is the R. Svir, which flows S.W. into Lake Ladoga. Lake O. communicates by canals with the Volga and thence with the Caspian Sea on the S.; with the Dvina, and thence with the White Sea on the N., and with the Vytegra by the Mariinskaya canal-system; the Stalin Canal lies along its S. shore, from the Svir R. to Vytegra, and assists navigation. The lake is rich in fish. Commerce is chiefly confined to the Stalin Canal.

Onehunga, maritime bor. of N. Is., New Zealand, 6 m. from Auckland, of which it is a suburb. There is a regular steamship service to and from New Plymouth, Wellington, and other ports. O. is of historic interest in that it was originally settled by military pensioners from England, and had the first lady mayor in the Brit. Empire (1894). Constituted a bor. in 1877. Pop. 16,500.

Oneida, one of the tribes forming the Iroquois nation.

Oneida: 1. City of Madison co., New York, U.S.A., situated at a height of 110 ft. above the sea, on the O. Creek, 26 m. W. of Utica. The prin. manufs. are furniture, wagons, engines, and machinery. The vil. of O. Castle, to the S.E., forms the gathering-place of the O. Indians,

whilst the headquarters of the co-operative O. community (see NOYES, JOHN HUMPHREY) are also to the S.E. Pop. 10,200. 2. Lake in New York, 6 m. to the N.W., of O. city, between the cos. of Oswego, O., Onondaga, and Madison. It is 20 m. long by 5 m. wide, and is drained by the O. R. into Lake Ontario.

O'Neill, Eugene Gladstone (b. 1888). Amer. dramatist, the first of international repute, b. in New York City. His father was James O'N., a well-known actor, who was celebrated in America for his star part in the old melodrama of *Monte Cristo*. O'N. studied at Princeton and Harvard, and then for a number of years led a most adventurous and varied existence. He went on a gold-hunting expedition to Honduras, spent sev. years in central and S. America, and worked as a sailor for two years. Returning to the U.S.A. he worked for a short time as a reporter, played a minor role in his father's company, and then spent months roaming the dock region of New York City. Stricken with tuberculosis, while in a sanatorium he wrote some one-act plays which were pub. at his father's expense. Upon restoration to health he went to Harvard Univ., and took a course in dramatic writings. *The Moon of the Caribbees* and *Six other Plays* was pub. in 1919. In the same year appeared *Beyond the Horizon*, his first full-length play. This won the Pulitzer prize in 1920, an honour later gained by two other of his plays. His early one-act dramas had been filled with realism. *Emperor Jones* (1921) was a clear break with realism, being rather an experiment in expressionism. The central figure, after whom the play is named, is a Negro who has made himself by sheer brute strength monarch of the ex-slaves in a W. Indian Is. There is a revolution against him. In eight short episodes the audience is shown the change from the proud emperor to the timorous, superstitious black, lost in the jungle whither he has fled from those who seek his life. Out of O'N.'s knowledge of the docks and the sea grew *Anna Christie* (1922), another study in realism, which achieved great success both in New York and in London. *The Hairy Ape*, which appeared in the same year, is a second drama of expressionism. *Desire under the Elms* (1923), reverts to realism, being a tragedy of passion played out on a New England farm. *The Great God Brown* (1925) has been acclaimed as one of the finest imaginative productions in Amer. literature. Here O'N. showed his growing distaste for mere naturalism and his increasing employment of symbolism. The same is true of his *Lazarus Laughed* (1927); Lazarus died and returned to life with the knowledge of what death is and its place in the larger purpose. *Strange Interlude* (1928) is one of the strangest of all his dramas. Edouard Dujardin, the Frenchman, discovered the interior monologue for literature, and was followed by James Joyce in his *Ulysses*; O'N. adapts the interior monologue to the stage. Running to nine acts, and taking five hours to play, it is a test of the patience

and attention of the audience. Though its construction may appear fantastic and unreal, in actual presentation it is singularly effective. His concern is with human beings caught up in the currents of life, and struggling against the forces of evil. He deals largely with the depressed classes, and especially with the colour problem, though his *Mourning Becomes Electra*, produced in London in 1938, was a powerful and sombre modern psychological study of the Electra (Oedipus) complex. His *Days without End* (1934) is a modern miracle drama. In 1936 he was awarded the Nobel prize. Later works include *The Iceman Cometh* (1946). See studies by S. K. Winther, 1934, and R. D. Skinner, 1935; also J. W. Krutah, *The American Drama since 1918*, 1939.

O'Neill, Hugh, see TYRONE, EARL OF; IRELAND.

O'Neill, Shane, second Earl of Tyrone (c. 1530-87), Irish chief and rebel, oldest legitimate son of Con O. (1484-1559) (who was made earl of Tyrone by Henry VIII. in 1542). After much civil strife he was recognised as chief by Elizabeth on her accession, but the recognition was revoked. During his life Ulster was the scene of constant war. He was again acknowledged chieftain of Tyrone in 1582, but with a reservation of the rights of Hugh (who succeeded to the title in 1587); made a treaty with the Eng. at Drumcree (1583); captured the chief of the MacDonnells (1585); invaded the Pale (1586); burned Armagh (1586); was defeated by the O'Donnells at Letterkenny in 1587, and murdered by the MacDonnells at Cushendun.

Onesonta, vil. of New York, U.S.A., in Otsego co., on the l. b. of the Susquehanna, 73 m. S.W. of Albany. Pop. 11,700.

Onesimus, St., disciple of St. Paul, under whose influence he came after robbing and running away from his master Philemon, a citizen of Colossæ. See Paul's Epistle to Philemon.

Ongtong, see under LORD HOWE ISLAND.

Onion (*Allium Cepa*), bulbous-rooted plant (family Liliaceæ), probably a native of central or W. Asia, and cultivated from a remote period. By successive sowings and by careful storage, Os. may be had all the year round. Usually two main sowings are made; the chief, early in spring, to produce Os. for autumn and winter use, or for storing. The other sowings are made towards the end of the summer, for transplanting in the spring, a system by which larger and earlier bulbs are obtained which are seldom, if ever, attacked by the O. fly. In ordinary gardens the thinnings from the autumn sowings usually provide a sufficient supply of the green or spring Os. used in salads. Any except stagnant soils will grow Os. if well manured and if rotations of crops are followed, but only a deep, rich loam produces the heaviest crops. The growth of large Os. for competition at shows is very popular. Unlike much exhibition produce, their mild flavour makes them generally preferable in the kitchen to those less carefully

grown. The best Os. for pickling are small, hard bulbs produced from April sowings on rather poor, dry, sunny land.

Onions, Charles Talbot (b. 1873), Eng. philologist; educated at King Edward V. School and Mason College, Birmingham. He entered the teaching profession, and then in 1895 joined the staff of the *Oxford English Dictionary*, of which he became joint editor in 1914. He continued his association with the dictionary until 1933, and was also editor of three editions of the *Shorter Oxford English Dictionary* in 1933, 1936, and 1944. He was a lecturer in Eng. literature at Oxford Univ., becoming fellow of Magdalen College in 1923, and in 1927 was appointed reader in Eng. philology. He was awarded the C.B.E., 1934. His valuable *Shakespeare Glossary* was first pub. in 1911.

Onions, Oliver (b. 1873), pseudonym of George Oliver. His first book, *The Complicated Bachelor* (1901) was written through the encouragement of the Amer. humorist-illustrator and editor Frank Gelett Rogers. His first novel was *The Odd-job Man* (1903). In *Little Devil Doubt* (1909) he attacked the 'yellow press.' Then appeared *Widdershins* (ghost and mystery stories) (1911) and, among others, *The New Moon* (1918); *Peace in our Time* (1923); *Ghosts in Daylight* (1924); *The Spite of Heaven* (1926). These were followed by the trilogy *In Accordance with the Evidence*, *The Debt Account*, and *The Story of Louie*, which were rewritten under the title *Whom God has sundered* (1926). The best known of his later stories are *The Collected Ghost Stories of Oliver Onions* (1935); *The Hand of Cornelius Voyt* (1939); *The Story of Ragged Robin* (1945); and *Poor Man's Tapestry* (1946), a poetic story of the Wars of the Roses for which he received the James Tait Black Memorial prize. His short stories are mainly ghost, mystery, and crime stories. O. is the husband of Berta Ruck (b. 1878), novelist, whose books include *His Official Fiancée* (1914); *The Unkissed Bride* (1939); and *Half-past Kissing Time* (1931).

Onitsha, tn. of S. Nigeria, on the E. bank of the Niger, at the beginning of the delta region. Its position renders it an entrepôt for the trade of the dist. Pop. 18,000.

Onkelos, see TARGUM.

Onklons, see under MOUND DWELLINGS. Onnes, Heike Kamerlingh (1853-1926). Dutch physicist; b. at Groningen, where he was educated and became Ph.D. He was for some time director of the physical laboratory at Leyden. O. produced a temp. of -268° C., to liquefy helium, and made discoveries as to effect of low temps. upon resistance to electric currents. He received the Nobel prize for physics in 1913.

Onobrychis, genus of leguminous herbs or shrubs with pinnate leaves and axillary spikes or racemes of purple, red, or white flowers. *O. montana* is grown on the rockery; *O. sativa* is the well-known and handsome fodder plant, sainfoin (q.v.).

Onomatopoeia (Gk. *ōnōma*, name, and *poiō*, to make), term in philology applied to the formation of words by an imitation

of the sound associated with the thing designated; e.g. hiss, whizz, plop. It is now considered that its part in the growth of language has been small.

Onomichi, port of Honshu, Japan, on Inland Sea. It manufactures fancy mats, and saké is produced. There are forty-eight Buddhist temples. Pop 42,000.

Onslow Bay, on the S E coast of N Carolina, U S A. It receives the Newport, New, White Oak, and other rivers.

Ontake, sacred Jap mt in the Jap Alps, with a fourteenth century Shinto shrine at the summit. Altitude 11 000 ft.

Ontario, S E. prov. of the dominion of Canada separated from the U S A by the St. Lawrence R. and the Great Lakes of Superior, Michigan, Erie, Huron, and O. It is that section of the dominion which is contained between the great international lakes and Hudson Bay, and between the W boundary of Quebec and the E limits of Manitoba. Its most S point is lat N 41° 41' and its most N, lat N 66° 48'. Until 1912 its total area was 260,862 sq m. In that year the prov was extended by Act of Parliament to include the E portion of Keewatin as far N as Hudson Bay, and its area now amounts to 412,582 sq m of which its water area of 49,300 sq m forms the unusually large percentage of 11.9. The area is thus about equal in extent to the combined areas of the six New England states of the U S A. The pop is 4,297,000 of the whole dominion. The pop increased by 2 110 000 between 1871 and 1938. The W portion of Keewatin is now included in the prov of Manitoba. The Canadian portions of the Great Lakes cover an area of 40,354 sq m. The N W point of the prov is close to Port Nelson on Hudson Bay, and its N E boundary is formed by James Bay, an extension of Hudson Bay. The surface is of an undulatory character, in parts well suited to agriculture, with low ranges of hills extending westwards towards Lake Huron. The prov is watered principally by the St. Lawrence and Ottawa Rs., and their numerous tributaries. The largest lakes exclusively in O are Nipissing, Simcoe and Nipigon. The climate of O is healthy and bracing but in most parts colder in winter and warmer in summer than that of Great Britain. At Toronto the temp ranges from 89.6° to 13.3°, giving a mean temp for the year of 44.8°. The rainfall averages 35 in annually. The soil of the arable areas is exceedingly fertile, and over 9,000,000 ac are under crops, the chief being oats, wheat, barley, and maize. The minor crops include rye, peas, mixed grain, sugar beets, potatoes, and turnips. Agric production in 1946 was valued at over \$746,000,000. Dairy farming and cattle raising are engaged in. Fruit farming, especially in the Niagara dist, is carried on extensively, and splendid apples and peaches are grown. General farming also a most important primary industry is carried on under unusually favourable conditions. The tobacco plant is extensively cultivated.

O. is rich in minerals, the prin being gold, nickel, silver, cobalt, bismuth, ar-

senical ore, zinc, and lead. Huge deposits of low grade iron ore exist. The value of mineral production in O. in 1939 was \$214,049 000. Gold represented \$112 115,000 of the prov's production in 1939 and with other metals, of which nickel, copper, silver, arsenical ore, and cobalt are the chief, made up over 70 per cent of the total for the prov. In 1947 the total value of mineral production was \$249 623,703. The nickel for the Sudbury dist amounts to 90 per cent of the world's production. Mining is a thriving industry in the Sudbury, Cobalt, Kirkland



WILLIAM L. L. L. L.

ONTARIO WELAND CANAL

A grain boat leaving the canal to enter Lake Ontario

Lake and Porcupine dists. Copper in matte is exported, and the production of metallic copper was 312,000,000 lb in 1939. Coal has not yet been discovered in any appreciable quantity, though lignite is being raised in the James Bay region but the means of obtaining it is rendered comparatively easy owing to the excellent system of canalisation and lake communication with the coal bearing dists outside the prov. The iron and steel industry in O is chiefly dependent on imported ores, but a high Bessemer grade iron ore deposit has been developed in O. Commercial production of iron ore, however was reported in 1930 from Michipicoten. The Atikokan dist W of Sarnia Lake contains some 15 000,000 tons of high sulphur magnetite, but no discoveries have been made in O of deposits of iron ore which do not require special treatment before being charged to the blast furnaces.

The deposits of high-grade mica and other essential war minerals proved valuable for the Brit. market when its feldspar supplies from Scandinavia were cut off. Development work for the production of asbestos was begun in 1941. The greater part of the Canadian production of common salt comes from wells in S.W. O. Gypsum is mined in Paris, O. Lumbering is an important industry, and the productive forests, which cover 174,000 sq. m., yield spruce, pine, birch, poplar, and other valuable timber. Fur production is valued at over \$4,000,000 annually. The petroleum wells in the S.W. of the prov. produce a steady supply of oil. The fisheries, which are valued at over \$3,000,000 a year, yield cod, salmon, bass, herring, lobsters, and mackerel. O. of all the Canadian provs., is the centre of the country's manufacturing life, owing to its abundant water-power resources and its proximity to the coal-fields of Pennsylvania. There are forty-seven hydro-electric power systems, using Niagara and other falls. The manufs. are numerous and varied; agric. implements, railway rolling stock, and textiles being the most important; but during the Second World War there was a rapid increase in the output of many kinds of munitions and other secondary manufs. essential to the Allies' war effort, such as aero engines, and aeroplane construction generally. The output equals that of the rest of Canada. There is great activity in the canning and pork-packing industries.

In respect to post-war planning schemes it is an important commentary that in a young country like Canada, in parts of its wealthiest prov., O., soil erosion, deforestation, and loss of water resources should have become extensive. The Ganaraska R., selected as a considerable area for post-war development, drains about 75,000 ac. and the water reaches have been seriously deforested, with wind and water erosion continuing after the destruction, so that a considerable portion of the upper part of the Ganaraska watershed is now unfit for successful agriculture. Its reforestation and other conservation methods will, however, be supplemented by dams for flood control. Spring flooding on the W. of S. O. is a very serious ann. danger, causing substantial loss to municipalities along their shores.

O. is well equipped with a variety of educational institutions, and has sev. univs. and colleges of importance. In recent years there has been in Canada a tendency to lengthen the period of compulsory attendance, and this tendency has been most marked in O., where in 1919 an Act was passed providing that children from eight to fourteen years of age must attend full time, and that young persons from fourteen to sixteen, who have not reached univ. matriculation standard, must attend full time; those exempted owing to their occupations must attend part-time classes. The operation of this Act has greatly increased the attendance in O. secondary schools. The average number of pupils attending educational institutions is over 700,000. The O. agric.

college and experimental farm at Guelph were estab. in 1874 to train young farmers in the science and practice of agriculture and to conduct experiments for the benefit of the prov. The Kemptville agric. school and farm had grown rapidly in importance before the Second World War. The horticultural experiment station at Vineland in the centre of the Niagara fruit belt is the most important station in Canada for work on the special problems of the fruit and vegetable grower. Other similar institutions are the Ridgetown experimental farm in the S.W. peninsula and the New Liskeard demonstration farm in N. O. The leading denominations in O. are United Church of Canada, Rom Catholics, Church of England, and Baptists, in the order named.

The ordinary revenue and expenditure in the years immediately preceding the Second World War balanced at about \$90,000,000. In 1918 the gross interin figures were revenue, \$190,850,000; expenditure, \$165,811,000. The estimated wealth of O. at upwards of \$10,000,000,000 represents about one-third of that of the whole dominion.

The prov. has a separate Parliament and administration, with a lieutenant governor at its head, assisted by ninety members (elected for five years), forming a Legislative Assembly which has power to control its own affairs, but must not conflict with the policy of the central administration of the dominion, to which are sent eighty-two members and twenty-four senators. The Executive Council consists of thirteen members, nine holding portfolios. Besides the regular depts., certain commissions have been created for specific purposes: these include the Niagara Falls Park Commission, Railway and Municipal Board, Hydro-Electric Power Commission, and Timiskaming and N. O. Railway Commission. The cap. is Toronto (695,300). Other important cities are Ottawa (the seat of government) (164,300); Hamilton (179,000); Windsor (118,500); London (87,319); Brantford (52,000); and Kingston (25,000). There is railway communication to all parts of the prov. Before the war of Independence the country was sparsely inhabited by roving tribes of Indians; but on the close of the war of 1783 thousands of Brit. loyalists crossed over into Canada, and this portion was called Upper Canada, a name it continued to bear until 1867, when it was renamed O. It is the premier prov., and is considered the most flourishing in the dominion. See also CANADA. See A. H. D. Ross, *Ottawa, Past and Present*, 1927; E. C. Guillet, *Early Life in Upper Canada*, 1933; F. Landon, *Western Ontario and the American Frontier*, 1941; and *Western Ontario*, 1943; R. L. Jones, *History of Agriculture in Ontario, 1613-1880*, 1946; and O. Bureau of Statistics and Research, *A Conspectus of the Province of Ontario*, 1947.

Ontario, Lake, lake of N. America, forming part of the S. boundary of the above prov., situated between lat. 43° and 44° N. and long. 76° and 80° W. Its length is 135 m., and its mean breadth is

about 50 m.; its depth ranges from 15 to 120 fathoms. The St. Lawrence R. forms its outlet on the N.E., while in the S.E. it receives the waters of Lake Erie, by means of the Niagara R. and the Welland Canal. Its area is over 7000 sq. m., and it contains sev. is. at its E. end. The lake abounds in fish, and it is noted for its Oswego bass. The chief Canadian ports on its shores are Toronto, Hamilton, Kingston, Port Hope, and Coburg, while Oswego, Sackett's Harbor, and Charlotte are the chief Amer. Stornis are prevalent on the lake, whose coasts are studded with lighthouses.

Onteniente, tn. of Spain, in the prov. of Valencia, on the Clariano, 45 m. S.W. of Valencia. Pop. 14,000.

Ontology (adapted from a Late Lat. word, *ontologia*, from the Gk. *on*, *ontos*, the present participle of the verb *einai*, to be, and *logos*, word or science), the name given to that branch of philosophy which deals with the problem of being, that is with reality in the abstract. The name given to the science by Plato was 'dialectic', whilst Aristotle's 'first philosophy' was akin to it. Though the name O. is not now used so much, it may be said to be that study which deals in a comprehensive manner with the ideas of reality, being, existence, etc., in their application to the objects of scientific thought. A great part of metaphysics has been bound up with these questions, though, of course, in the dawn of philosophy the possibility of objective reality was not questioned. Wolff was the first philosopher to use O. as a technical term. He divided theoretical philosophy into that which deals with being in general (subjective or objective) and that which deals with particular entities. The former he called O., whilst the latter was divided into psychology, cosmology, and natural theology, according as the entities were the soul, the world, or God. The theory that the nature of knowledge itself is the first study of philosophy, and that not until a conclusion has been come to on this does the nature of being admit of study, has of late years superseded Wolff's theory. Thus with the evolution of metaphysics O. has been relegated to a secondary place. See articles on PHILOSOPHY, PSYCHOLOGY, METAPHYSICS, etc., and on the various religious systems, all of which have some ontological basis. See J. MacTaggart, *Nature of Existence*, 1927; G. Santayana, *Rein of Essence*, 1928; C. G. Stone, *The Social Contract of the Universe*, 1930; E. Meyerson, *Identity and Reality*, 1930; W. Ehrlich, *Ontologie des Daseins*, 1910; L. De Raeynacker, *Philosophie de l'être*, 1946; and P. Coffey, *Ontology and the Theory of Being*.

Onus Probandi (Lat., burden of proof). In the law of evidence the general rule is that the burden of proving any fact alleged lies on him who pleads such fact, not on him who denies or 'traverses' it; e.g. if A alleges that he sustained personal injuries by reason of B's negligent driving of a motor car, it is on A to give at least prima facie evidence of B's negligence before B can be called upon to give re-

butting evidence. The general rule is best expressed in Stephen's words, that the O. P. lies on that party against whom judgment would be given if no evidence were produced on either side. Of course, as a trial proceeds, the burden may be, and usually is, shifted from the party on whom it originally rested to his opponent by reason of his proving facts which raise presumptions in his favour. Following the general rule, the burden of proving facts alleged by way of *confession and avoidance* (q.v.) lies on him who alleges such facts; and the burden cannot be shifted by pleading what is really a *confession and avoidance* in the form of a 'traverse' (q.v.) or direct denial. See also EVIDENCE.

Onychium, small genus of evergreen ferns with finely divided, graceful fronds. *O. auratum* needs stovehouse culture; *O. japonicum* is more hardy, but must be kept somewhat dry in winter. It is easily increased by div. of its numerous crowns.

Onychophora (Gk. *onyx*, claw, *phora*, to bear), class of the phylum Arthropoda (i.e. insects, crustaceans, and other invertebrates with jointed legs), includes sev. genera, but the term *Peripatus*, estab. by Gudding (1826), is still commonly used as the generic name for all. He included it in the Mollusca, but Moseley (1874) proved conclusively its arthropod structure. The characteristics of the class are the presence of air tubes, tracheae; a dermomuscular body wall; paired excretory ducts, the nephridia; and a body composed of many similar segments bearing 'feet.' The head is joined directly to the body and bears



PERIPATUS

single pairs of antennae, jaws, and oral papillae; the openings of the tracheae are scattered over the body. The jaw muscles are striated. Malpighian tubules are absent. *Peripatus*, of which there are many species, is found in the S. continents, Malay, New Zealand, and the E. and W. Indies. It looks somewhat like a caterpillar of medium size, and lives in damp places under the bark of trees. In its heart and lacunar circulation, small oelom and hemocoel, salivary glands, the presence of tracheae, the modification of its anterior appendages as mouth parts, and its regular ecdysis, *Peripatus* resembles the Arthropoda. It differs from them in the absence of exo-skeleton and external segmentation; the soft cuticle and muscular body wall; the segmentally arranged nephridia with ciliated tracts. In these and other characters it resembles the Annelida (segmented worms), and may be regarded as providing the 'missing link' between the two groups.

Onyx, chalcedony composed of alternating white and black or dark brown layers. These colours are often modified by artificial staining in order to enhance the value of the stone for ornamental purposes. It was highly valued by the

ancients and used for cameos. The term 'O. marble' was at one time applied to alabaster. A variety of O. is sardonix, which contains alternating bands of dark red carnelian (sometimes called sard). The best varieties of O. are obtained in India.

Oodnadatta, tn. of S. Australia, N.W. of Lako Eyre, on the railway from Port Augusta to Alice Springs. Pop. 100.

Ookiep, mining tn. of Namaqualand, Cape Prov., S. Africa, 92 m. E.S.E. of Port Nolloth. Copper ore is mined in the dist. Pop. 2000 (100 whites).

Oolite, or **Roestone**, limestone which is composed of small rounded grains, which show in their section under the microscope a concentric shell arrangement. Each grain shows also a radial structure, and under polarised light should give a black cross if a true sphere. The concentric layers of the grain are gathered round a nucleus, which may be a quartz granule, a piece of shell, or other organic body. Some modern Os. (as at Carlsbad) are probably due to algae (*Girardinella*) which secrete lime from the surrounding waters and build up these radiate and fibrous grains. The Os. are well developed in the Jurassic system, the entire varieties being called peastone or pisolite.

Oology, science relating to birds' eggs, their identification, classification, etc. The general characteristics of birds' eggs are a shell composed chiefly of carbonate of lime with smaller quantities of phosphate of lime and magnesia, a membrane enclosing the food material, the white or albuminous food material, the yolk or yellow portion, and the minute germ from which the living organism develops. Some shells have an outer glazed layer like porcelain glaze, as in the ostrich egg; others have a chalky outer layer, as in the eggs of cuckoos, cormorants, and grobes; yet others have a translucent outer layer as in the kingfisher's egg. Eggs are also identified by their shape; those of the plover are pear-shaped, those of the sandpiper cylindrical, those of owls are spherical, while the majority have the familiar shape of the hen's egg. Colour, or pigmentation, occurs in wide variety, both in individuals and in different species. The uniform tints or ground colouring may be brownish, blue, yellow, brick-red, or green; superposed on this may be lines or spots or both of different colour or different intensity, while the eggs of rails and plovers often exhibit double spots; that is, strongly marked spots superposed on a wider area of fainter hue. It may be mentioned that a special licence is necessary for the collection of wild birds' eggs, as they are now almost everywhere protected by law.

Oorial, see **URIAL**.

Oort (or **Noort**), Adam van (1557-1641), Dutch painter, b. at Antwerp. Among his pupils was Rubens. He had considerable ability, especially as a colourist. He became a member of the guild of St. Luke in 1587.

Oostende, see **OSTEND**.

Oosterbeek, vil. of the Netherlands, 3 m. W. of Arnhem, was the 1st Airborne Div.

headquarters in the Arnhem battle. A memorial was unveiled in 1946 to the Brit. troops, most of the dead being buried in a nearby cemetery.

Oosterhout, tn. of N. Brabant, Netherlands, 5 m. N.E. of Breda. There is trade in agric. produce, manufs. of pottery and tiles, tanning and sugar-refining. Pop. 15,000.

Oostkamp, tn. in W. Flanders, Belgium, 4 m. S. of Brugge. The inhab. are mainly engaged in agriculture, cattle breeding, and manufs. of linen. Pop. 7700.

Ootacamund, tn. in the Nilgiri hills dist., Madras, India; summer headquarters of Madras Gov. The chief sanatorium of S. India, it is situated at an altitude of 7500 ft. Pop. 29,000.

Ooze, see under **OCEAN AND OCEANOGRAPHY**.

Opacity, that property of a body which prevents light passing through it. Newton explained this property by the unequal densities of the particles of the body, the light being so irregularly reflected and refracted that ultimately it becomes absorbed. On the wave theory of light it is explained as being due to the fact that the pores between the particles of the body stop the vibrations of the ether.

Opah, see **SUN-FISH**.

Opal, hardened colloidal condition of silica, usually containing a small percentage of water. It is found disseminated in veins and nests through rocks, and is also formed from the siliceous waters of some hot springs (geysers). In colour, O. is white, grey, yellow, red, etc., the colours varying according to the position in which the stone is held. Precious O., which exhibits a delicate play of colours (opalescence), is found in Hungary, Mexico, Queensland, New S. Wales, and S. Australia, and for jewellery is cut with a convex surface. Large stones are difficult to procure for jewellery, owing to the multiplicity of flaws with which they are intersected. Fine O. found in Mexico gives fire-like reflections. Hydrophane is an opaque white or yellow variety, which becomes translucent and opalescent on immersion in water. Wood O. is wood replaced by silica, the grain of the wood being preserved. It has a variety of colours, and is used for ornamental purposes. Hyalite, a transparent glossy variety of O., occurs in stalactite form. Menilite occurs in concretionary forms in shaly deposits, and is sometimes called liver O. Float-stone is a tuberos or porous siliceous mass which floats on water. Tripoli infusorial earth is related to O.

Opava (Ger. **Troppau**), cap. of Silesia, Czechoslovakia, on the O. R., a trib. of the R. Oder. It manufs. textiles and machinery, and beet sugar. Pop. 35,000.

Opencast Mining, see under **MINING**.

Open Field System. O. F. S. of farming was in vogue during the time of William I. The arable and of the manor farms consisted of three large open fields, one for wheat or rye (the bread crop); another for barley, for barley cakes and beer (the drink crop); and the third ploughed to rest the soil (fallow). The fallow field in the

next year would be sown for wheat, while the barley field would become fallow, so that every three years each field would in turn be rested. The fields were divided into strips of 1 ac. or $\frac{1}{2}$ ac., and were separated by low ridges of unploughed turf, instead of by hedges, thus being open, as opposed to the enclosed field of to-day. Laxton in Nottinghamshire and Yarnton in Oxfordshire are farmed in some degree on similar lines to-day, and at Eton certain meadows are thrown open during Aug., Sept., and Oct. to the cattle of the villagers under the care of a 'hayward.' See further under COMMONS AND ENCLOSURES.

Open Hearth (Siemens) Steel Process, see under IRON AND STEEL.

Openshaw, dist. of Lancashire, England, included in the city of Manchester, is a manufacturing area, with textile, engineering, and chemical works. The Manchester-Stockport canal traverses the dist.

Open Spaces. Statutory recognition of the hygienic value of O. S., especially in developing dists., is a matter of comparatively recent legislation. The earliest legislation under this description is to be found in the Recreation Grounds Act, 1859, which was passed to facilitate grants of land near populous dists. for the regulated recreation of adults and as children's playgrounds. The object of the Public Improvements Act, 1860, was to assist municipal hors. and pars. of over 500 inhab. in acquiring land for recreation or to enhance the amenities of their dists. The Town Gardens Protection Act, 1863, was passed for the protection of gardens in squares, etc., which had been allowed to fall into neglect, but it is an Act of limited operation. Power of keeping order in royal parks is given to the commissioners of works by the Parks Regulation Act, 1872, as amended in 1926. The London Parks and Works Act, 1887, provided for the maintenance of certain public parks (these include Victoria, Battersea, and Kennington Parks, the Chelsea Embankment, and the Bethnal Green Museum Garden) in the metropolis, a duty which has since devolved on the L.C.C. By the Parks Regulation (Amendment) Act, 1926, the definition of a 'park,' as contemplated by the prior Act of 1872, is extended so as to cover all O. S. under the control of the commissioner of works, except such as did not come under the Act of 1872 before 1926. It thus includes all parks, gardens, recreation grounds, O. S., and land invested in and under the control of the commissioner, and the latter authority is empowered to make regulations for the public use of such places. By the London Squares and Enclosures (Preservation) Act, 1906, a number of squares and gardens were protected from being built upon. The Metropolitan Open Spaces Acts, 1877 and 1881, applied only to the metropolis. These Acts, and the Open Spaces Acts of 1887 and 1889, enabled urb. and rural dist. councils to secure existing O. S. for the use of the public. By the Open Spaces Act, 1906, which repeals and consolidates all the

previous Acts on the subject, and extends powers as to O. S. to co. and par. (as well as to urb. and rural dist.) councils, an open space is defined as 'any land, whether enclosed or not, on which there are no buildings, or of which not more than one-twentieth part is covered with buildings, and the whole or the remainder of which is laid out as a garden, or is used for purposes of recreation or lies waste and unoccupied.' The Act provides that trustees (or any one else) having in their control an open space or any interest in an open space, may, subject to the consent of two-thirds of the owners and occupiers of houses fronting the open space, or who are liable to be rated for its maintenance, convey the open space either out and out, or for a term of years, to the local authority with a view to its preservation and regulation as a public garden or open space. There are also analogous powers as to securing, for the public benefit, land which is used for recreation by the inhab. of certain houses, or over which the right of enjoyment by way of exercise and recreation has been already secured by covenant only to the owners or occupiers of houses round or near the open space. Further, the owners of a disused burial ground may convey or lease the same to a local authority, so as to give the public access to it, and the local authority may then lay out and improve the ground. But games or sports may only be played on disused burial grounds under an episcopal licence, if the ground be consecrated; if not, under the sanction of the body from whom the ground was taken over. Particulars as to tombstones or monuments proposed to be removed must be registered, and notice of any such proposal given to persons interested. The Act also empowers local councils to appropriate land already under their control for use as an open space. Having acquired ground for an open space the local authority is bound to keep it in a decent state; and may not only enclose it with railings and gates, and drain, level, light, and otherwise improve it, but may make by-laws for its regulation. Urb. dist. councils and co. councils are empowered under the Open Spaces Act, 1906, and the Public Health Act, 1875, to acquire and maintain or contribute to the maintenance of public walks or pleasure grounds. Dist. councils may borrow for the purposes of the Open Spaces Act in the same way as they may borrow under the Public Health Act, 1875 (see LOANS, PUBLIC).

The L.C.C. has power to exchange land in the metropolis for O. S., to provide lands for sports grounds and swimming baths, to acquire lands for public walks and pleasure grounds; to contribute to the expenses of local authorities for similar purposes, and to enclose O. S. to provide dancing places in O. S. under their control, and to flood and enclose O. S. for skating. These powers are given by the L.C.C. (General Powers) Acts, 1905, 1921, 1923, and 1926.

As many anct. monuments are situated in O. S. we may conveniently include under this title the Ancient Monuments

Consolidation and Amendment Act, 1913, which recognises the principle, now to be found implicit in all recent town and country planning Acts, that the nation has an interest in ancient monuments apart from the interests of the legal owners of the monuments. The regulations under town-planning legislation state that draft plans and maps of town-planning schemes should show what provision is being made for O. S., recreation grounds, and playgrounds.

The term O. S. is also used in a cognate but technically distinct sense in connection with building by-laws framed under the London Building Acts and the Public Health Acts, such by-laws having for their object the enforcement on builders of the obligation to keep a proscribed space about buildings so as to secure a free circulation of air. See W. G. Lunley, *Public Health Acts* (6 vols., 11th ed.), 1939-46.

Opera, drama of any description with musical setting for voices and orchestra. The modern art-form arose in Italy about 1600, but its origins go back much further, through the medieval mystery plays to the Attic drama, in which music played an important part. Perhaps the first essay in the direction of O. was the song-play of the thirteenth century; *Robin et Marion*, a song-play by the eminent trouvère, Adam de la Halle, has claims to be regarded as the first comic O. Late in the sixteenth century an aristocratic Florentine circle of musicians and literary men known as the Camerata, reacting against the current polyphonic musical style and attempting to revive the principles of Attic drama, began to write dramatic works in a new declamatory style—recitative. The leaders were the composers Peri and Caccini and the poet Rinuccini. The first known It. opera is *Dafne* (1597) by Peri and Rinuccini; the first of which the music survives complete is *Euridice* (1600) by the same collaborators; this libretto was set by Caccini two years later. A different approach was through the madrigal. Vecchi's *Amfiparnaso* (1597), a series of madrigals not intended for the stage, yet approaches dramatic form. The first great master of O. was Monteverdi, whose *Orfeo* was produced at Mantua in 1607. His madrigals had already gone a long way in dramatic expression; he now enriched a dramatic text by greatly strengthening the orchestral and harmonic elements, and foreshadowed the later aria in his attempts at sustained melody. The distinction between recitative and melody or aria became clearer in his successors Cavalli and Cesti, but the balance of music and drama was lost; the It. love of vocal and scenic display usurped the functions of dramatic characterisation. The subjects were still generally classical, but comic episodes were introduced as a diversion.

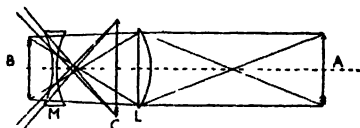
In 1637 the first O. house was opened at Venice. O. soon spread to other It. towns, then to Paris (c. 1645), Vienna, and Germany, where it flourished in Hamburg. The Fr. O. was founded in 1669 by the poet Perrin, and the first Fr. O., by Perrin and Caribert, was produced there in 1671.

But it was the It. Lully who, incorporating the native ballet, established the tradition of Fr. grand O., continued in the next century by Rameau. Like the Venetians, Lully worked under the patronage of the court, which his Os. were designed to glorify. In England the foundations of a native O., based on the masque, were laid by Purcell; but owing to his early death *Dido and Aeneas* (1689) remains a solitary pointer to the Eng. O. that might have been. Elsewhere O. remained It. in form, style and language. By the end of the century the leading influence was the Neapolitan school under Alessandro Scarlatti, followed later by Porpora, Pergolesi, and Cimarosa. With the aid of the poets Zeno and Metastasio the form became rigidly standardised; Scarlatti was responsible for the *du capo* aria, the two kinds of recitative, *secco* (accompanied only by the harp-chorus) for the rapid transaction of dialogue, and *stromentato* (accompanied by the orchestra) for more dramatic moments, the rejection of the chorus, and the separation of the monumental *opera seria* from the more racy *opera buffa*. Scarlatti himself with his great melodic and expressive powers was able to animate this style, but with lesser composers it soon deteriorated into empty vocal display. Even the lyrical and dramatic genius of Handel could not preserve it; his most important dramatic experiments were made in his Eng. oratorios, which are really Os. in disguise with the great asset of a chorus. The important reforms of Gluck were in essence a return to the principles of Monteverdi. He opposed the tyranny of the singer, and especially of the *castrato*, who always sang the chief male parts in It. *opera seria*, and concentrated on dramatic expression and characterisation. His new style was first prominent in *Orfeo* (1762), and fully developed in the Os. he wrote for Paris from 1774, in which he adopted the Fr. emphasis on ballet and chorus. Meanwhile a popular O. of contemporary life with spoken dialogue had appeared in various local forms: ballad O. in England (*The Beggar's Opera*, 1728); *opera comique* in France; *Singspiel* in Germany. At first a reaction from the classical-dynamic *opera seria* of the court, this led directly to the romantic and national O. of the next century. The cosmopolitan Mozart wrote masterpieces in all the current forms: *opera seria* (*Idomeneo*); *opera buffa* (*Le Nozze di Figaro*); and *Singspiel* (*Die Zauberflöte*); and made great advances in characterisation and orchestral detail. The Ger. romantic O. of Weber stems partly from Mozart and the *Singspiel*, partly from the ethical Fr. grand O. of the revolutionary period under Cherubini and Spontini (the Paris stage, continually dominated by foreigners, has always kept its tradition). Beethoven's *Fidelio* springs from the same stock. The distinctions between aristocratic and popular O. now began to disappear, and the centre of the operatic world shifted to Paris, where Meyerbeer in grandiose political Os. and Auber in *opera comique* led the field, presently joined by Offenbach in

operetta. In Italy the singer still reigned supreme, but the brilliant wit and vivacity of Rossini and the melodic charm of Donizetti and Bellini give their Os. distinction. Ger. dramatic music is dominated by Wagner. Influenced by Weber, whose remarkable *Euryanthe* (1823) is the source of sev. innovations generally attributed to Wagner, and also by Meyerbeer, he evolved a new form which he called music-drama. This has little in common with traditional O., and finds its closest parallel in the symphonic poems of Liszt—with the stage action superimposed as a key to the musical thought. Wagner's genius, instrumental and symphonic rather than vocal and dramatic, thus found its perfect expression; but the conviction expressed in his many writings that he was revolutionising O. by returning to the principles of Gluck and Attio drama misled his successors. A misunderstanding of Wagner lies at the heart of even the best later Germ. Os., such as Humperdinck's *Hänsel und Gretel*, Wolf's *Der Corregidor*, and the various output of Richard Strauss. Meanwhile traditional O. progressed rapidly in Italy and France. Verdi, beginning with crude melodrama and vocal extravagance in the Donizetti manner, in his last Os., *Otello* (1887) and *Falstaff* (1893), reached a musico-dramatic balance on the highest level, such as It. O. had not known since Monteverdi. His successors of the *verismo* school, Mascagni and Leoncavallo, sacrificed musical values to dramatic sensationalism; and Puccini marred an individual musical and dramatic talent by crudely assaulting the emotions of his audience. In France the striking if imperfect dramatic genius of Berlioz has always been neglected. Gounod attempted, only with partial success, to bridge the gap between the outworn conventions of Fr. grand O. and *opera comique*. Bizet gave the latter a blood-transfusion in *Carmen* (1875), but died before he could follow up his success. The many operas of Massenet and Saint-Saëns are more notable for craftsmanship than creative power. Far more original is Debussy's single O., *Pelléas et Mélisande* (1902), a masterpiece of impressionistic suggestion that has found no true successor. Russian O., largely founded on a rich folksong tradition, began with Glinka and Dargomizsky and reached its height in Moussorgsky's *Boris Godunov* (1874). Borodin's *Prince Igor* (1890) has an opio grandeur; Rimsky-Korsakov's Os. are remarkable for fantasy, melody, and orchestral colour, rather than characterisation. Tchaikovsky combined the native Russian with the Fr. tradition. Czech O. was formed by Smetana out of folksong and the Liszt-Wagner symphonic style; he was followed by Dvořák, whose gifts were more lyrical than dramatic, and Janáček, an original melodist with strong dramatic gifts, who rejected all intellectual elements and aimed at a naturalistic utterance. Falla and Granados in Spain and Bartók in Hungary have made interesting experiments in O. Most remarkable of modern continental Os. is Alban Berg's *Wozzeck* (1925), in which late romantic naturalism

is combined with the atonality of the Schoenberg school. In England O. has only recently been freed from a certain moral stigma; there are promising signs of a true school of Eng. O. The operettas of Sullivan were distinguished by wit, melody, and delicate scoring. In the twentieth century the strongest influences have been Wagner (Delius, Boughton), and folksong (Holst, Vaughan Williams), but the recent Os. of Britten show a stronger dramatic gift and a broader appeal. See R. A. Streetfield, *The Opera* (5th ed., revised by E. J. Dent), 1925; F. Howes and P. Hope-Wallace, *A Key to Opera*, 1939; E. J. Dent, *Opera*, 1940; and D. J. Groux, *A Short History of Opera*, 1947.

Opera Glass, or Galileo's Telescope, instrument used for obtaining a magnified image of some distant object. It consists essentially of two lenses, a converging lens as objective, and a diverging lens as the eye lens. The objective lens L would form a real inverted image B of the distant object A. But before this image is formed



OPERA GLASS

the rays fall on the diverging lens M, which renders them divergent so that they appear to come from the image C which is erect. C is the image which is seen by the observer. The fact that the image seen is erect, and that the telescope is comparatively small in size, makes it extremely useful as an O. G.

Operational Calculus. In mathematics 'operations,' such as addition, subtraction, integration, differentiation, etc., are represented by symbols. During the nineteenth century it was realised that the symbols or 'operators' were themselves susceptible to manipulation, irrespective of their operands. This led to a branch of higher mathematics called symbolic logic, of which the O. C., invented by an engineer, O. Heaviside, is an example. Heaviside's methods were at first looked on with suspicion by the purists, as being not rigorous enough, but his work was of great practical application, especially in electrical engineering, and the O. C. has now been reconciled with other theories such as the calculus of finite differences and been shown to derive logically from the earlier Laplace transformations. See N. McLachlan, *Theory of Complex Variables*, 1930, and *Modern Operational Calculus*, 1948.

Operation Overlord, see **OVERLORD**

'Operation Pluto,' see under **PIPE-LINE**

Operation Sealion, the (Ger. plan for the invasion of Britain (1940). (Ger. plans for invading Britain begun in Nov. 1939, were intensified in July 1940, when Hitler was faced with the first major check to his strategy. Seeing that Britain showed no

signs of coming to terms, he decided to undertake a landing operation, and the Ger. staff were given until mid Aug. to prepare it. The Ger. leaders, who were apprehensive of the proposed operation through fear of the R.N., thought it essential that the Ger. Air Force should accept the double role of both destroying the R.A.F. and preventing the Brit. Navy from attacking a landing force, and Goering (q.v.) was confident that the Ger. Air Force would be equal to these tasks. But the Ger. Naval High Command took the view that, even if the Luftwaffe had defeated the R.A.F. in the battle of Britain, it would still have been incapable of carrying out its second task; but it is probable that, if the R.A.F. had been defeated, the landing operation would have been launched. So far as it went the general plan of O. S., as it was called, was for landing two armies with twenty-five divs. in all, between Folkestone and Eastbourne and Brighton and Selsey Bill. Ten divs. were to be landed to form the initial bridgehead, and after eight days an advance was to be made to the first objective, a line running from the Thames estuary along the hills S. of London to Portsmouth, and others were to be made to cut London off from the W. as quickly as possible. Parachute troops were to be used to capture Dover, and a third army might possibly be used for a landing in Lyme Regis Bay if necessary. But later orders showed that Hitler was most reluctant to take a decision, though on Sept. 3 directives were issued to prepare for embarkation at Rotterdam, Antwerp, and Le Havre, and D-Day was fixed for Sept. 21. Again, however, Hitler postponed the operation, and orders were given to disperse concentrations of craft in view of allied air attacks, and on Oct. 12 the operation was called off until the spring, the fact being that the battle of Britain had resulted in the failure of the Luftwaffe to carry out the first of its tasks, the destruction of the R.A.F. In July 1941 Hitler again postponed the operation until the spring of 1942 on the assumption that by that time the Russian campaign would be completed. The project does not seem to have been seriously considered again, and was finally cancelled in Jan. 1942.

It was widely believed in Britain that a Ger. invasion attempt was actually launched in 1940, a belief based partly on the fact that a number of Ger. bodies were washed up on the S. coast in Aug.-Sept. 1940, and partly on the knowledge that the 'invasion imminent' signal was issued by Brit. general headquarters, Home Forces, on Sept. 7, 1940. The facts were that in Aug. 1940 the Gers. were embarking their army in the barges in harbours along the Fr. coast, but there is no evidence that they ever left harbour as a fleet to invade Britain. Bombing raids on those harbours were carried out by the R.A.F., and some barges were sunk. During the ensuing six weeks some thirty-six bodies of Ger. soldiers were washed up at scattered points along the coast between Cornwall and Yarmouth. A report on possible Ger. action was considered by the

Brit. chiefs of staff on Sept. 7, 1940, and as this report indicated that Ger. preparations for invasion were so advanced that it could be attempted at any time, the chiefs of staff, taking into account the Ger. air attacks against aerodromes and aircraft factories, agreed that the possibility of invasion had become imminent, and that the defence forces should stand by at immediate notice. The official Brit. statement on Ger. plans, made in the House of Commons on Nov. 18, 1940, was based on captured Ger. documents and interrogation of Ger. prisoners of war (see Hansard, Nov. 18, 1940). It would appear that there was little enthusiasm amongst the Ger. naval chiefs for 'Sealion,' and no real understanding by the army of the difficulties inherent in cross-Channel invasion. See A. Martienssen, *Hitler and his Admirals*, 1948.

Opercularia, genus of herbs or subshrubs (family Rubiaceae) with small globular heads of white flowers. *O. aspera* and *O. hispida* are sometimes grown in greenhouses, requiring a soil composed of equal parts of sandy loam, fibrous peat, and leaf soil.

Operculum (Lat., a lid), in botany, the term which is used in speaking of the lid of the capsule of mosses. It forms a cover for the peristome, and falls off when the spores are ripe. In fishes (q.v.) it is the cover over the gills.

Ophicleide (Gk. *ὄφις*, a serpent, and *κλειρ*, a key), obsolete brass wind instrument of the bassoon type, but more closely related to the serpent, whose coarse tone it had. It was probably invented by a Fr. musician named Fricot settled in London, c. 1790, and called bass horn. This, however, was actually the Russian bassoon, whereas the *O.* descended from the cornett family. It resembled the bassoon in shape, but was thicker and more uncouth, had eleven or twelve keys, a mouthpiece like that of the trombone, and a compass of about three octaves. Mendelssohn wrote for the *O.* in *Eljalá* and *Midsummer Night's Dream*. Also a 16-ft. reed organ pedal stop of powerful tone.

Ophidia, see SNAKES.

Ophiopogon, or *Snakeshead*, genus of perennials (family *Hamodioraceae*) with long narrow variegated leaves, and racemes of white or lilac flowers. They are natives of the Himalayas and Japan.

Ophir, region celebrated in ant. times for its fine gold. It is frequently mentioned in the O.T., and it was from *O.* that gold and precious stones were brought by Solomon's sailors. Its position has been the subject of much dispute. Suggested localities are Zimbabwe, in Mashonaland; Abhira, at the mouth of the Indus; Suhara, in Goa; Mt. O., in Johore; and S. Arabia.

Ophites (Gk. *ὄφις*, a serpent), or *Naasenes* (Heb. *nachash*, a serpent), early sect of Gnostics who, in addition to the usual doctrines which they held in common with the other sects, taught that special veneration should be paid to the serpent, the introduction of knowledge into the world being due to the serpent that tempted Eve. They are referred to by

Hippolytus, Irenaeus, Origen, and other early Church writers. See Gnosticism.

Ophiuchus, see SERPENTARIUS.

Ophiuroides, see BRITTLE-STARs, and ECHINODERMATA.

Ophrys, genus of hardy terrestrial orchids with beautiful flowers, many of which bear a remarkable resemblance to insects. *O. apifera*, the bee orchid, is about a foot tall, and has three to six bee-like flowers in a loose spike. Other Brit. species are the fly orchid (*O. muscifera*) and two rare spider orchises.

Ophrysia, see under PHEASANT.

Ophthalmia, inflammation of the eye. This term is not now in general use, the inflammation being related to the affected part or parts of the eye. *O. neonatorum* is a form of purulent conjunctivitis which sometimes attacks newly born babies.

Ophthalmology (Gk. ὀφθαλμός, eye; λόγος, discourse), the science of the eye, its anatomy, physiology, visual functions, and diseases (for anatomy and physiology see EYE). Emmetropia is the condition of normality in vision. Hypermetropia (long sight) is the condition in which the clear image of a distant object would lie in a plane behind the retina, and is corrected by convex lenses. Myopia (short sight) exists when the image of a distant object lies in a plane in front of the retina, and may be corrected by concave lenses. Astigmatism is that condition where no single undistorted image of a distant object exists, but two separate line foci at right angles to each other are present. This defect is corrected by cylindrical or toroidal lenses. Presbyopia is that condition produced by loss of accommodation to a degree that objects within the normal reading distance cannot be viewed with comfort (usually from the age of forty-five onwards). This is corrected by a convex reading addition to any existing distance correction required.

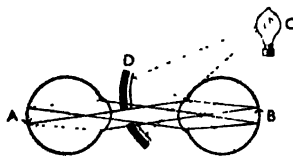


FIG. 1. DIRECT METHOD: SELF ILLUMINATED

Cataract is any opacity of the lens of the eye, and is generally not congenital. It may be caused by the excessive heat of furnaces and welding arcs, by senescence, concussion, or as a secondary condition in certain types of general disease. Some forms of cataract are small and non-spreading, and operation is not necessary for these; where operation is necessary this cannot be performed until the cataract is 'ripe.' Opacities occur also in the vitreous humour and may impair vision. Abnormalities in the general health are usually associated with the inflammatory conditions of iritis, keratitis, conjunctivitis, choroiditis, retinitis, and optic neuritis. Glaucoma is a serious disease,

caused by the development of excessive pressure within the eye. Trachoma, common in the E., is a severe form of conjunctivitis. O. deals also with affections of the lachrymal gland, orbit, eyelids, and eye muscles. In all cases, before any form of treatment is applied, it is important that the affection should be correctly diagnosed.

See J. Meller, *Ophthalmic Surgery*, 1923; W. Stewart Duke-Elder, *Recent Advances in Ophthalmology*, 1927, and *Textbook of Ophthalmology*, 1932-40; T. H. Shastid, *Outline History of Ophthalmology*, 1927; H. Neame and F. A. Williamson-Noble, *Handbook of Ophthalmology*, 1939, 1944; and A. Sorsby (ed.), *Modern Trends in Ophthalmology* (second series), 1948.

Ophthalmoscope, optical instrument designed for examining the surface of the retina of the human eye, invented by Helmholtz (1851). Since his time many types of Os. have been designed (using Helmholtz's basic principles), and with the modern instruments the structure and health of the corneal, aqueous, crystalline lens, vitreous, and retina may be investigated. An estimate of the refractive error of the eye may also be made with the O. There are two methods of viewing the retina, direct ophthalmoscopy and indirect ophthalmoscopy.

Direct Method (Fig. 1).—The instrument will include in the handle the source of light, C, and behind the mirror D a battery of lenses will enable the observer A to focus the structures of the eye described above. In modern instruments it is usual to include a convex lens system between the source C and the mirror D, and the mirror D may then be a plane mirror.

Indirect Method (Fig. 2).—In this method the source C is behind the eye B, and the mirror D will consist of a concave retinoscope and the light is focused by the

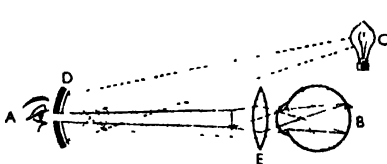


FIG. 2. INDIRECT METHOD

convex lens E. By this method the observer A may only view a small magnified area of the retinal surface. Other parts of the eye may not be examined by this method.

Ophthalmoscopy enables the practitioner to observe the only part of the vascular system functioning which can be made visible, hence its extreme importance in diagnosis of the health of the eyes and the whole body. An adaptation of this instrument enables one observer to use both eyes with a binocular O.; another permits a number of observers to receive demonstration of a specific eye; incorporation with a camera enables photographs of the retinal fundus to be taken.

Opie, Amelia (*née Alderson*) (1769-1858), Eng. novelist, b. at Norwich. Her husband was John O. (q.v.), the painter. She pub. *Simple Tales* in 1806, and many novels, including *The Dangers of Coquetry* (1790); *Adeline Mowbray* (1804); and *Valentine's Eve* (1816). See C. L. Brightwell, *Memoir of Amelia Opie*, 1855, and J. Menzies-Wilson and H. Lloyd, *Amelia: the Tale of a Plain Friend*, 1937.

Opie, John (1761-1807). Eng. painter, b. at Harmony Cot, near St. Agnes, Cornwall, son of a carpenter, whose real name was Oppy. He evinced such skill in taking portraits that Dr. Wolcot (better known as Peter Plunder), the Truro physician, took him into his house and afterwards (1780) to London. He soon became famous and, in 1782, received a commission from the king, and advanced rapidly as a fashionable portrait painter, among his subjects being Johnson, Burke, and Fox. He was also an historical painter. He became an associate of the Royal Academy in 1787, and, in the following year, a member. His tomb in St. Paul's is near that of Sir Joshua Reynolds. His work, while not aiming at ideal beauty or refined poetical conception, is characterised by energy of style and vivid realism. Two of his pictures, 'William Siddons' and 'The Assassination of David Rizzio,' are in the National Gallery, London. See A. Earland, *John Opie and his Circle*, 1911.

Opinicus (heraldry), fabulous animal borne as a charge, having the head and wings of a griffin or eagle, a short tail like that of a camel, and the body of a lion. It is sometimes represented without wings. It forms the crest of the Barber Surgeons of London.

Opitz, Martin (1597-1639), Ger. poet, b. at Bunzlau, Silesia. In 1625 he was crowned poet laureate at Vienna by the Emperor Ferdinand II. A patent of nobility was conferred on him in 1629, in the title of von Boberfeld. In 1630 the burggraf of Dohna sent him on a mission to Paris, where he met Grotius. He became historiographer to Ladislaus IV. of Poland in 1638. His poems are more reflective than imaginative, and are rather cold and formal. See studies by F. Gundolf, 1923, and H. Max, 1931.

Opium is obtained by drying the juice of the unripe capsules of the poppy (*Papaver somniferum*). The plant is extensively cultivated in India, Asia Minor, Egypt, Persia, and China. Sown in Nov. in rich loose soil, the poppy-heads are ready to be operated upon by the end of Feb. O. has a bitter nauseous taste, and a heavy narcotic odour. Its properties as a drug are due to the alkaloids which it contains, viz. morphine, narcotine, thebaine, narceine, iodine, etc. These alkaloids are either free or combined with such acids as meconic, lactic, or phosphoric. O. also contains gum, saccharine matter, fat, and water. The habit of eating O. is very prevalent, especially in the Far E. Its use is usually begun to relieve pain or sleeplessness, and after a month's use the individual becomes a confirmed O.-eater. If taken in excess O. poisoning is set up,

and the victim suffers from dyspepsia and nervous attacks. After a large dose of O. the person lies in a state of coma. Respiration is slow and noisy, the pulse is often slow but full, and the eye pupils contract. The skin also becomes pale and livid, and covered with a cold perspiration. For O. poisoning an emetic or coffee is given, and the patient is kept moving if possible. For smoking O. a pipe of peculiar construction is required, and the effects are much the same as in the case of O. eating. As a medicine, O. is taken in cases of great pain or sleeplessness. It is also invaluable in cases of diabetes, diarrhoea, and heart disease; and is usually given in the form of laudanum, a tincture prepared by dissolving O. in dilute alcohol.

The O. traffic was a great source of revenue to India, but of late years attempts have been made to stop the traffic. In 1906 the Chinese Gov. prohibited the use of O. in schools and the army, and ordered all habits to be registered and their allowances gradually decreased. O. is produced in India under special gov. supervision in the United Provs., and under special arrangements in the central India, Rajputana, and Gwalior States, and is bought in its crude condition from the cultivators in the United Provs., and from the durbars of the states concerned by the gov. at fixed rates. It is disposed of by the gov. (a) by issue to the excise dept. for local consumption under revenue regulations and by export in small quantities to Aden, Fr. and Portuguese settlements in India, Nepal, and Zanzibar (b) by supply to the medical dept. in India, and by export to the United Kingdom for sale to chemists. The gross revenue from O. in 1915-16 was £742,000. Formerly most of the exported O. went to China, but in 1907 the Indian Gov., in furtherance of the efforts of the Chinese Gov. to suppress the cultivation and use of O. in China, decided gradually to reduce the amount exported to China, and as from 1917 its export was entirely prohibited. In 1928 the gov. of India announced its intention to restrict the export of O. otherwise than for medicinal purposes. Exports of provision O. to foreign countries ceased at the end of 1935.

In 1948 the Permanent O. Board in Geneva expressed grave concern at the presence of Iranian opium in the illicit traffic in many parts of the world. In 1949 the World Health Organisation convened a conference of E. Mediterranean countries on the subject. O. is an important crop in Turkey, in the Afyon Karahisar and Konya dists.

Opium War, name given to hostilities between Great Britain and China in 1840, following the destruction of Brit. ships taking opium to China. The war resulted in the cession of Hong Kong and the treaty ports. See E. H. Parker, *The Chinese Opium War*, 1888, and H. B. Morse, *The International Relations of the Chinese Empire* (vol. I.), 1910.

Opland, inland co. of Norway, including the prosperous Gudbrandsdal valley, which runs to Lake Mjosen in the S.E..

and takes the chief road to the coast. The land is high in the N., and low in the S. Pop. Lillehammer. Area 9608 sq. m. Cap. 153,200.

Opobo, port of S. Nigeria, near the mouth of the O. R., 80 m. W.S.W. of Old Calabar. Pop. 12,000.

Opole (Ger. Oppeln), tn. of Upper Silesia, Poland, on the r. b. of the Oder, 42 m. N.N.W. of Radbórz (Ratibor). The manufs. are cement, lime, machinery, and cigars, and there are railway repair shops. O. was captured by Russian forces under Gen. Konev on Jan. 24, 1945. The church of St. Adalbert was founded at the end of the tenth century, and there is a fifteenth-century castle. Pop. 52,800.

Opon, tn. of Cebu, Philippine Is., opposite Cebu city. It is noted as the place where Magellan died in 1521. Pop. 23,000.

Oporto (Portuguese Lat. Portus Cale; O Porto, the port), city of Portugal, in the prov. of Minho, on the N. bank of the Douro, 3½ m. from the Atlantic and 209 m. by railway N. of Lisbon. Leixões is the seaport for O. It has been secured from storms by two great jetties and is served from O., 5 m. away, by both standard and narrow-gauge railways. The city has sev. public squares, the largest being the Praça da Liberdade, containing a bronze statue of Dom Pedro IV. All over the city are fountains and well-laid-out promenades, among the latter being the fashionable Sunday promenade in the crystal Palace gardens. Many of the Coueses of O. date from the sixteenth century. The streets of the old tn. are narrow and tortuous, although there are sev. good modern boulevards, notably the Rua dos Clerigos, the streets of Santo Antonio and Santa Catarina, and the Rua das Flores. This last named, which may be described as the Regent Street of O., can show some very fine examples of the local gold and silver filigree work. The cathedral, which must originally have been a noble edifice, but has been infamously modernised, stands near the bishop's palace. It has a fine interior, including a solid silver altar and retablo. The church of Sao Francisco, near the Bolsa (Exchange) is a mass of beautiful carvings of the fifteenth-sixteenth centuries. The Clerigos Church has the highest spire in the country (246 ft.) and was built in 1748. The spire dominates the city from every point. Some 400 yds. to the S. of the Praça da Liberdade is the bridge of Dom Luiz Primeiro, crossing the Douro in a single span of 560 ft. at a height of 120 ft. There is another bridge higher up the gorge, and both were built by Eiffel, the engineer of the Eiffel Tower, Paris. It was from the monastery between these two bridges that Wellington launched his attack against Soult. There is a univ., founded in 1911, and also a special college for music. O. is one of the four military regions of Portugal. O. is the centre of the port wine trade. Apart from the shipping mostly carried on from Leixões, other industries include spinning and weaving, sugar refining, distilling, and tanning, and the manuf. of pottery,

tobacco, and paper. In anct. times the site of O. was occupied by the harbour-tn. Portus Cale, afterwards Porto Cale, from which has been derived the name of the kingdom, Portugal. It was an important city during the supremacy of the Moors. In 1808 it was taken by the Fr.; but in the following year it was retaken by an Anglo-Portuguese force under Wellington. Pop. 265,000.

Opossum, word derived from the Amer. Indians, and applied to the various members of the marsupial family Didelphyidae. Fossil forms have been found in different parts of the world, but the only living Os. occur in N. and S. America. In habit all are arboreal, except *Chironectes minimus*, an aquatic species, and nocturnal; in diet they are carnivorous or insectivorous. The number of digits is invariably five, and there are fifty teeth; the tail is usually long and prehensile, and the pouch is frequently absent. The chief genus is *Didelphys*, and consists of twenty-three species, varying in size from that of a cat to a rat. The commonest of these is *D. virginiana*, which occurs in the U.S.A. It has coarse, yellowish hair tipped with brown or black, a scaly tail, hairy at the tip, short legs, and a pig-like snout. The young are carried by the mother in her pouch. The young of *D. dorsaigera* have the interesting habit of curling their tails round their mother's, and being borne about in this fashion. *Chironectes*, the water O., or yapock, has completely webbed feet, and lives upon fish.

Oppeln, see OPOLE.

Oppenheim, Edward Phillips (1866-1946), Eng. novelist and short story writer, b. in London and educated at Wykeston grammar school, Leicester. His departure from school for the family leather business is amusingly told in his autobiography, *The Pool of Memory* (1941). He began with a novel, *Expiation*, at an early age and then, after sev. failures, entered into an agreement with the *Sheffield Daily Telegraph* for the first serial rights of six novels at £250 each. Altogether O. wrote some 150 books and, besides being one of the world's most prolific authors, he was among the best writers of 'thrillers.' Trans. into most European languages, he was especially popular with Ger. readers until he exploited Ger. hostility to Britain. But his story of espionage, *The Kingdom of the Blind* (1917), was an excellent vindication of his soundness of view, as against the Ger. propagandists who charged O. with fomenting bad feeling between the two countries. His *Nobody's Man* (1923), a departure from his thriller genre, is a clever 'take-off' of 'politicians.' Other books which were particularly favoured by his large public were *Mysterious Mr. Sablin* (1898); *The Double Life of Mr. Alfred Burton* (1914); *Mr. Grex of Monte Carlo* (1917); *The Double Traitor* (1918); *The Great Prince Shan* (1922); *Prodigals of Monte Carlo* (1926); *The Channing Syndicate* (1927); *The Glenlillen Murder* (1929); *The Million Pound Deposit* (1930); *Gallows of Chance* (1934); *The Strange Boarders of Palace Crescent* (1934); *Bird*

of *Paradise* (1936); *Dumb Gods Speak* (1937); *A Pulpit in the Grill-Room* (1938); and *Advice Limited* (1939). He also collaborated in two plays: *The King's Cup*, produced at the Adelphi in 1909, and *The Eclipse*, at the Garrick in 1919. The first named was of the cloak and rapier type; the second a musical comedy. After the First World War he settled in S. France. His later books included *The Sky Plutocrat* (1941), and *Mr. Mirakel* (1942).

Oppenheimer, Sir Ernest (b. 1880), chairman of De Beers Consolidated Mines Ltd., and many other S. African and Rhodesian mining companies, and one of the world's leading industrialists. He began his career at the age of seventeen in the London office of A. Dunkolsbuhler and Company where he gained his early experience of the diamond world. In 1902 he was sent to S. Africa in connection with the firm's interests in Kimberley. In 1908 he was elected a member of the city council and became mayor in 1912, which office he held till 1915. He was largely responsible for the raising of the 2nd Kimberley Regiment at the outbreak of the First World War and during the Second World War devoted himself to the services of the Red Cross and other welfare organisations. In recognition of the services rendered to S. Africa over a number of years he was knighted in 1921, and from 1924 to 1938 he sat as S. African party member for Kimberley in the Union Parliament.

Oppenheimer, John Robert (b. 1901), Amer. physicist, son of a Ger.-Jewish immigrant and successful textile exporter. He graduated from New York's Ethical Culture School, where he had an intensive course in chess. At Harvard, where he graduated in three years, he studied under the physicist P. W. Bridgman and the philosopher A. N. Whitehead (q.v.). At twenty-one he went to England to study under Lord Rutherford and Sir J. J. Thomson at Cambridge Univ., and also went to Göttingen where he earned his Ph.D. at twenty-three with a brilliant paper on quantum mechanics, and concluded with still further study at Leyden and Zürich. From 1928 he taught science at the California Institute of Technology and the Univ. of California, winning a great reputation, and developing at that Univ. an outstanding school of theoretical physics. In March 1943 he was chosen by the U.S. Army to head a new scientific laboratory from which emerged the first atomic bomb. O. became chief executive of a \$60,000,000 company with 4500 workers, including such eminent physicists as Enrico Fermi and Niels Bohr, though he had never even been chairman of a physics faculty. It was recognised, however, that apart from his knowledge of physics, he had the capacity to make people pull together and work at fever pitch. Subsequently he was appointed to a small board of seven members to suggest U.S. policy on the future of atomic energy, and was responsible for much of the writing and many of the ideas, in a resulting report, which was co-

signed by David Lillenthal, chairman of the U.S. Atomic Energy Commission and Dean Acheson, the then under-secretary of state, and which called for an international atomic development authority. He is president of the Amer. Physical Society, and director of the Institute of Advanced Study, near Princeton.

Oppert, Julius (1825-1905), Ger. Assyriologist, b. of Jewish parents at Hamburg. He made a special study of ancient Persian, and in 1847 pub. his *Lautsystem des Altpersischen*. In 1867 he became prof. of Sanskrit at Paris, and he was employed on various philological missions by the Fr. Gov.

Oppian, name of the author of two didactic poems in Gk. hexameters. Modern criticism has estab. the fact that the poems are by two writers of the same name. *Halieutica*, a poem of about 3500 lines, on fishing, dedicated to Aurelius and his son Commodus, was probably written by a native of Anazarba or Corycus in Cilicia, who flourished in the reign of Marcus Aurelius (161-180). *Cynegética* (2150 lines), on hunting, is dedicated to Caracalla, which places its date after A.D. 211, and its author was probably a native of Apamea or Pella in Syria.

Ops, Rom. nature goddess, wife to Saturn, and mother of Jupiter. As her name indicates, she was symbolical of plenty and fertility, and a protectress of all things connected with agriculture. Most of her temples and festivals she possessed in common with Saturn, and on the Capitol she shared the honours with her son Jupiter.

Opsonein (Gk. *ὀψωνεύω*, to obtain food). The capacity of the white blood corpuscles to absorb and digest invading bacteria (phagocytosis, q.v.) was shown by Douglas and Sir Almoth Wright in 1903 to depend on the presence of O. in the blood serum: white corpuscles washed free from serum are unable to carry out phagocytosis. In addition to normal opsonin, which has a generalised action on all bacteria, special O. or bacteriotropins are formed against specific bacteria as a result of immunisation. The opsonic index of a patient is the ratio of the number of bacteria ingested by a white corpuscle in the patient's serum to the corresponding number for normal serum; it varies between about .5 and 2, being high in patients who have been immunised or are convalescing from a disease.

Optical Glass, see under GLASS.

Optical Illusion, see ILLUSION; MIRAGE. **Optician**. An 'ophthalmic O.', according to the National Health Service Act of 1946, is a person having the prescribed qualifications in optics (q.v.), including the measurement of errors of refraction, in orthoptics, and in the fitting and supply of optical appliances. A 'dispensing O.' is a person having the prescribed qualifications in the fitting and supply of spectacles.

Optic Nerve, see EYE.

Optics, science that deals with the phenomena of light and vision. O. is usually divided into three branches: (1) physical O., for which see LIGHT

(2) physiological O., see VISION; and (3) geometrical O., with which the present article is concerned. It is a matter of everyday experience that we cannot see round corners, a fact that suggests that light may travel in straight lines. The suspicion is strengthened by taking a number of opaque screens punctured by a small pin-hole and arranging them so that a straight line can be drawn from a source of light through the pin-holes to the eye. The source of light can then be seen, but if one of the screens is shifted slightly, no light enters the eye, showing that, to a very close approximation at least, light travels in straight lines. Refined apparatus shows that this is only an approximation, however (see DIFFRACTION), but for all practical purposes it is assumed that light does travel in straight lines, and the straight lines of light are called rays of light. When light strikes the surface separating two media, one or both of two things may happen: viz. (1) the light may be reflected at the surface; (2) the light may be refracted into the second medium (in each case some absorption of light takes place). The two laws governing the first of these events are known as the *Laws of Reflection*: (a) the incident ray, the reflected ray, and the normal to the reflecting surface at the point of incidence lie in the same plane; (b) the angle of incidence is equal to the angle of reflection. The *Laws of Refraction* are: (a) the incident ray, the refracted ray, and the normal to the surface separating the two media at the point of incidence lie in the same plane; (b) the ratio of the sine of the angle of incidence to the sine of the angle of refraction is a constant for two given media and is known as the refractive index of the second medium relative to the first. The ratio is actually the ratio of the velocity of light in the first medium to its velocity in the second (the ratio varies for different coloured lights).

The function of geometrical O. is to reduce the behaviour of all types of mirrors, plane, spherical, paraboloidal, etc., and of all types of refracting bodies, plane, spherical and cylindrical surfaces, lenses, prisms, and systems of lenses, to simple, general terms derived from the application of the laws of reflection and refraction to the case under discussion, making use of the propositions of Euclidean geometry. Some of the results are summarised below.

Plane Mirror.—The image of a point is as far behind the mirror as the object is in front of it, and the line joining the object and image is normal to the mirror.

Spherical Mirror.—If the radius of the sphere of which the mirror is a small portion is r , then the position of the image of a point object on the axis of the mirror is given by the equation $\frac{1}{v} + \frac{1}{u} = \frac{2}{r}$, where

u is the distance of the object from the mirror, measured along the axis, and v is the distance of the image from the mirror, measured along the axis. All these distances are reckoned positive if measured in the direction opposite to the incident

light, negative if measured in the same direction as the incident light. (Convention of signs.)

Spherical Lens.—The position of the image of a point on the axis of a lens is given by the equation

$$\frac{1}{v} - \frac{1}{u} = (\mu - 1) \left(\frac{1}{r_1} - \frac{1}{r_2} \right)$$

where v and u are respectively the distances of the image and object measured from the centre of the lens, μ is the refractive index of the material of the lens relative to the surrounding medium, r_1 and r_2 are the radii of curvature of the front and back surfaces of the lens respectively. All the distances are measured in accordance with the convention of signs given above. See also REFLECTION, REFRACTION, and other articles on various branches of light. See T. Preston, *Theory of Light*, 1912; A. S. Ramsey, *Geometrical Optics*, 1914; E. Holmbyard and F. Barraclough, *Heat, Light and Sound for Beginners*, 1931; R. A. Houston, *Treatise on Light*, 1938; W. J. Humphreys, *Physics of the Air* (3rd ed.), 1940; R. A. Sawyer, *Experimental Spectroscopy*, 1945; B. K. Johnson, *Practical Optics*, 1945; and W. E. Williams, *Applications of Interferometers*, 1947.

Optimism (Lat. *optimus*, best), word having both a strictly philosophical and a popular sense. The well-known doctrine of Leibnitz, in his *Essais de Theodicee* (1710), that 'everything is for the best in this best of all possible worlds,' may be taken as the extreme of the optimistic philosophical doctrines. Leibnitz did not mean that everything in the world was perfect; but while admitting the existence of evil he maintained that the monads, of which he believed the universe to consist, strive after ultimate perfection. Therefore of all the infinite number of possible worlds which presented themselves to the mind of the Creator, the existing one was the best possible. The evil which Leibnitz admitted to be in the world he divides into three kinds: metaphysical, physical, and moral. The explanation of the two first named, that one is unavoidable in a created being, while the other is a punitive and admonitory agent, is much more satisfactory than that of the last; it is that problem which Leibnitz's system, like many others, fails to solve. The milder form of O., which believes that on the whole the universe is advancing towards a better state of things, is more properly called meliorism or evolutionism. Generally speaking, a teleological view of the universe connotes some form of O. which is found in conjunction with idealistic rather than materialistic theories. In the popular sense of the word O. means the belief that 'there is a soul of goodness in things evil,' and that whatever exists is right in some inscrutable fashion, or can be made the means of good. Alternatively O. may simply mean the habit of 'looking on the bright side of things,' which naturally springs from a belief in the ultimate triumph of good. See B. A. W. Russell, *A Critical Exposition of the*

Philosophy of Leibniz, 1900, and E. Westernmark, *The Origin and Development of Moral Ideas*, 1917. The opposite of O. is pessimism (q.v.).

Optional Clause, otherwise Article 36, paragraph 2, of the Statutes of the Court of International Justice (see also INTERNATIONAL JUSTICE, COURT OF). The statutes, in the original draft, gave the court compulsory jurisdiction in certain classes of disputes as between all members of the League of Nations, the chief of which concerned the interpretation of treaties, any question of international law, and the nature or extent of reparation for the breach of an international obligation. But in the final draft there was substituted a clause which members could adopt by declaring that they would recognise as compulsory *ipso facto* and without special agreement, in relation to any other member accepting the same obligation, the jurisdiction of the court in the above noted classes of disputes. This is the O. C. In 1910 there were thirty-eight states adherent to the O. C. (Germany did not renew her signature, and Japan withdrew from the court in the same year), including Great Britain, the dominions, and other leading countries. In 1940 Britain renewed for a further five years its acceptance of the jurisdiction of the permanent court, under the same reservations as previously, and with the further reservation that it was not prepared to accept the court's jurisdiction in disputes arising out of events occurring at a time when His Majesty's Government are involved in hostilities.

Opuntia, genus of succulent trees and shrubs (family Cactaceae). They are natives of America, and some species, on account of their value as fencing plants in hot dry countries, have been introduced into S. Africa and Australia, where they have rapidly spread, and by reason of their formidable poisonous spines have tended to become a serious plague. The spines can be removed and the Os, chopped up like cultivated roots as food for cattle. There are, however, a few spineless species, of which *O. cochineifera* is the best fodder plant.

Opus (Lat., work). Its abbreviation Op. is used as a prefix to enumerations of a composer's works. Its lt. equivalent, *opera*, at first had the same meaning, but is now used almost exclusively in its later specific sense.

Opus operatum, in theology, term introduced by the schoolmen to express the manner in which the sacraments are efficacious. Certain general dispositions may be necessary in the receiver, but it is not these dispositions which render the sacrament effective. The reception of sacramental grace and its degree depend, indeed, upon the state of the receiver, but is caused by the outward sign instituted by Christ. Thus Bellarmine says: 'When we say the sacrament confers grace *ex opere operato*, our meaning is that grace is conferred by virtue of the sacramental act, instituted by God to this end, and not by the merit of the minister or of the recipient.'

Opwijk, tn. in the prov. of Brabant, Belgium, 11 m. N.W. of Brussels, mainly engaged in agriculture. Hops and flax ear largely cultivated. Pop. 8200.

Oracle (Lat. *oraculum*, from *orare*, to speak), place at which a deity answers the questions of his votaries through the mouth of his inspired minister, or the response given. Recourse to Os. is found among most of the nations of the anc. world, but the practice is specially studied with reference to the Gk. examples. Such methods of divination may be divided into three main classes: (1) that which depends on an examination of certain phenomena interpreted according to rule; (2) that in which the O. is delivered in frenzy by an inspired priest or priestess; (3) direct revelation in dreams, or by intercourse with spirits. To the first class belong all methods of divination by animals and the examination of their entrails when sacrificed. The second class were also common in Greece, though few of the oracular shrines were really famous. The best known, then as now, was the O. of Apollo, at Delphi. An account of the procedure here may be taken as showing the main features of the method. The O. was pronounced by a prophetess, the Pythia. After preparing herself by ceremonial purifications by drinking the sacred waters of the Castalia and by chewing the leaves of the sacred laurel, she took her seat on the sacred tripod over a hole in the floor of the cave, through which, according to anc. writers, vapour ascended, throwing her into an ecstasy. Her ravings were taken down by the priests, who put them into the form of hexameter verse. The Delphic O. was famous throughout the Gk. states, and many interesting accounts of the answers received there are given.

Oradea Mare, formerly Grosswardein, tn. of Rumania in S. Bihar, near the Hungarian border, and until 1918 part of Hungary, lies on the Körös 150 m. S.E. of Budapest. It was ceded in 1940 to Hungary, and returned to Rumania after the war. Reputedly founded in 1080 by St. Ladislaus, it contains an old fortress and many public buildings, including two bishop's palaces since it is the seat of both Rom. Catholic and Gk. Catholic bishops. Pottery and distilling are carried on. Pop. (mainly Magyar) 92,900.

Oradour-sur-Glane, small tn. in the dept. of Haute-Vienne, France, 15 m. N.E. of Rochechouart. It was the scene during the Second World War of one of the worst of all Ger. atrocities, when about 800 inhab. were massacred, only some seven or eight escaping the Ger. fury. Alleging, without foundation, that an arms dump had been found there, the Gers., on June 10, 1944, shot all the men of the tn. in a barn in batches of twenty. The women and children were driven into the church, the doors of which were locked after a large case of explosives had been deposited inside. This case exploded soon afterwards and, when the building was in flames, Ger. soldiers heaped chairs and benches on the imprisoned victims, on whom the roof then collapsed. Meanwhile Ger. soldiers drenched all the houses

and barns with some incendiary substance and set the whole place ablaze. The bishop of Limoges condemned the atrocity and summoned the people of Limoges to a memorial service in Limoges Cathedral on June 16. When the service, attended by thousands of people, was held, time-bombs were discovered in the crypt of the cathedral. These had been put there by members of the Vichy militia. It is said that the Gers. had intended to burn not O., but Oradour-sur-Vayre, which is in a dist. where there was serious fighting between the men of the *maquis* (Fr. resistance forces) and the Gers. First confirmation of this terrible episode was afforded by the fact that the regional prefect and the bishop of Limoges visited O. and described the tn. as no more than a collection of charred ruins and charred bodies.

Oræfa Jökull (the frozen mount of solitude), volcano, and the highest mt. of Iceland, situated in the S.E. of the country, and adjoining Vatna Jökull on the S. It reaches a height of 6426 ft. Eruptions occurred in 1341, 1362, 1598, and 1727. It was first ascended in 1891.

Orange, Alfred Richard (1873-1934), Brit. journalist, b. at Dacre, Yorkshire, educated privately and trained as a teacher. He taught under Leeds council till 1906, and came to London as a journalist in 1906. With Holbrook Jackson he took over the editorship of the *New Age*, which under his direction soon became a forum for the views of the best-known journalists, as well as for O.'s weekly commentary, noted for its incisive dialectic, its wide vocabulary, and its consistency in outlook and policy. O. wrote two books on Nietzsche (*Friedrich Nietzsche: the Dionysian Spirit of the Age*, and *Nietzsche in Outline and Aphorism*), whose principles he applied to sociology in his propaganda for national guilds. After the First World War he became a protagonist of the Douglas Social Credit plan until he gave up the editorship of the *New Age* (1932). For two years he lectured in America on literature and psychology and on his return to England in 1932 founded the *New English Weekly*, in which he advocated financial reform on Douglas credit principles. An *Alphabet of Economics* appeared in 1917. See memoir by P. Malret, 1936.

Orakzais, Pathan tribe of N.W. India, inhabiting the mts. of Tirah, on the Kohat border. Their origin is obscure. Risings among them were put down by the Brit. in 1856, 1868, 1869, 1891, and by the Tirah expedition under Sir Wm. Lockhart in 1897-98.

Oran: 1. Most westerly dept. of Algeria, divided into the four arrons. of O., Mostaganem, Sidbel-Abbes, and Tlemcen. The dist. is fertile and rich in minerals. Area 23,450 sq. m. Pop. 1,623,460. 2. Cap. of above dept., a fortified seaport standing at the mouth of a small stream, at the foot of the Sainte Croix, 70 m. N.E. of Tlemcen. It is a Fr. naval station and has a moderately good harbour, and there is an excellent one at Mers-el-Kebir, 3 m. distant. Most of the

tn. is modern and well built after the Fr. style. It is a centre of the wine industry, and has a large export trade in grain, wine and spirits, livestock, hides and wool, and esparto grass. The climate is healthy though hot. It was in the hands of Spain during 1509-1708 and 1732-92, when it was abandoned after being largely destroyed by earthquakes. It was occupied by France in 1831.

In July 1940, after the Hitler-Pétain armistice, the Brit. Gov. gave a six-hour ultimatum to Fr. ships at O. They were offered, but rejected, conditions which were intended to prevent Germany and Italy from seizing them. A Brit. battle squadron under Adm. Somerville (g.r.), attacked them, assisted by aircraft. One Fr. battleship was sunk and another damaged, one battle cruiser was damaged, and two destroyers and a seaplane carrier were set on fire and sunk. There were only slight Brit. casualties (July 3). The Pétain Gov. broke off diplomatic relations with Britain as the result of this action. On July 6 It. ships were bombed at O. U.S. troops landed near O. on Nov. 8, 1942. Pop. 194,700.

Orange, properly the fruit of *Citrus Aurantium*, a species with many varieties which are divided into two main groups. (1) the sweet O., and (2) bitter, Seville, or bigarade O. There is a sweet O., a Maltese variety, the pulp of which is entirely acidless, but this is of no commercial importance. The original home of the O. was probably the Burmese Peninsula and S. China, and its culture gradually spread W. till it reached Italy, Spain, and Portugal in the sixteenth century. It now flourishes in most parts of the world where soil and climate are suitable, a single tree producing, when mature, 10,000 or more fruits. Commercial production of the O. is carried on in California and Florida, U.S.A. The quality of the fruit is not indicated by the external appearance; e.g. the W. Indies produce a pale but juicy and finely flavoured O. which is on sale in Britain in the last three months of the year. From Christmas onward the Denia Os. from Spain and the attractive seedless fruit from California are the best obtainable. For summer consumption considerable imports arrive of Navelines, a delicious S. African mandarin O. The O. can be grown in suitable well-ventilated and well-lighted structures with less trouble than grapes, and the overgreen character and fragrance make it a plant worth growing, apart from the fruit. O. leaves have medicinal value, and the flowers are distilled to yield neroli oil and neroli camphor.

Orange: 1. City of Essex co., New Jersey, U.S.A., 12 m. W. of New York. It is a favourite residential centre, and manufs. hats, electrical supplies, etc. Pop. 35,700. 2. Tn. of Franklin co., Massachusetts, U.S.A., on Millers R., 35 m. W. of Fitchburg, with manufs. of machinery. Pop. 5600. 3. Co. seat of O. co., Texas, U.S.A., on Sabine R., 90 m. N.E. of Galveston. Pop. 7400. 4. Tn. of Vauduse dept., France, on R. Aigues, 12 m. N. of Avignon. A synod held here in 529 (*Aransio*

of the Roms.) is of importance in the Pelagian controversy. O. contains some fine Rom. remains, and was the cap. of an independent principality from the eleventh to the sixteenth century; in 1531 it passed to the house of Nassau, distinguished members of which were William the Silent, Maurice of Nassau, and William III. of England. O. passed to France in 1713. Pop. 13,900. 5. Tn. of New S. Wales, Australia, on the E. slopes of Mt. Canobolas, 170 m. W.N.W. of Sydney. Farming is carried on. It is one of the best fruit-growing (cherries, apples, pears, plums, grapes, peaches, figs, etc.) dists. of Australia, and sheep (the dist. is noted for its fat lamb production) and cattle are reared. Gold, copper, and silver are mined. There are woollen mills, a small-arms factory, an electrical works, and fruit storage plants. Pop. 15,000.

Orangeburg, city of S. Carolina, and co. seat of O. co., 39 m. S.S.E. of Columbia. It has oil mills and cotton industries. Pop. 10,500.

Orange Free State, formerly a S. African Boer republic, now a prov. of the Union of S. Africa, bounded on the W. and S. by Cape Prov. (the Orange R. forms the S. boundary); on the N. by the Vaal R.; and on the E. by Basutoland and Natal. The high veld of the O. F. S., with the Transvaal, lies across the westward sloping surface of the plateau of S. Africa, the Vaal and Orange R. system carrying the waters of the E. through the Kalahari desert to the Atlantic Ocean. Its surface mainly consists of undulating, grassy plains and plateaux, sloping towards the N. from the Drakensberg Mts. in the S.E. to the E.; on the Basutoland border it is hilly. Generally speaking, the country lies at an altitude of 4000 to 5000 ft. above the sea. It is watered by the Vaal and Orange Rs., with their tribs. the Modder, Caledon, etc. The climate is temperate and healthy, with moderate rainfall. Typhus, however, is endemic, as indeed in half the Union. Stock farming, to which the country is admirably suited, forms the main industry, sheep, cattle, horses, and pigs being largely bred. An increasing amount of land, especially in the E., is being devoted to agriculture, which receives every encouragement from the gov. There are over 250,000 ac. under wheat. Maize, potatoes, oats, fruit, and tobacco are also grown. There is considerable mineral wealth. Diamonds are found near Jagersfontein and Koffyfontein, and the produce averages over £1,000,000 in value annually. (In Jan. 1919 the find of a stone of 388 carats was reported.) Coal is mined just S. of the Vaal, and to a lesser extent in Vierfontein. Iron ores, gold (see OENDAALEHURST), and salt are also found. Trade is mainly carried on with the United Kingdom. Cottons, wool, ostrich feathers, leather, and hides, diamonds, etc., are exported. During the Second World War diamonds, and particularly industrial diamonds, showed a decided boom, and the diamond mine at Jagersfontein is expected to reopen as soon as machinery is available. The cap. is Bloemfontein. Other im-

portant ins. are Harrismith, Smithfield, Ladybrand, and Jacobsdal.

The prov. has an administrator aided by a prov. council of twenty-five members (elected for five years). There is an executive committee of four members. It sends eight members to the Senate, and thirteen to the House of Assembly of the Union Gov. The O. F. S., like the Transvaal, has never extended the franchise to any but the white pop. Justice is administered under the Rom.-Dutch law. The prin. religious body is the Dutch Reformed Church. Education is free up to matriculation standard and compulsory up to the age of sixteen, but exemption may be granted in special cases or when a child has passed standard vi. and is in regular employment. Unless parents object, the two official languages, Eng. and Afrikaans, are taught to all pupils, the home language of the pupil being the chief medium of instruction and the second language being introduced gradually during the primary school course. Higher and technical education are under the control of the minister of education for the Union, while primary (including elementary) and secondary education are controlled by the administrator of the prov. There are about 151 European public schools and about eleven aided private schools, with a total enrolment of 10,600 pupils; and about 513 non-European public and aided schools, with total enrolment of 61,300, and four training institutions for native teachers. Area 49,647 sq. m. The census of 1946 gave a pop. of 875,000 (European 201,000; non-European 674,000).

History.—The earliest Boer settlement on the N. of the Orange R. was made about the year 1828, after which came the great trek of 1835–36, when 10,000 people, following the refusal of the Brit. Gov. to agree to the extension of the colonial boundary to the Kei R. as a move against predatory Kaffirs, and also in consequence of the abolition of slavery, crossed the Orange R. to escape altogether from Brit. rule. These settlers, however, soon quarrelled with the Griquas, who were under the protection of the Brit. Gov., with the result that Sir Henry Smith, in 1848, annexed the whole country S. of the Vaal, an event which led to the Boers taking up arms under their old leader, Pretorius, who was defeated at Boomplaats in 1848, and then retired with some of his adherents to the N. of the Vaal. The ter. was then known as the Orange R. Sovereignty. The Brit. Gov., however, in view of increasing difficulties with the Basutos, abandoned the country in 1854, and its independence as the O. F. S. was confirmed at Bloemfontein in that year, much against the will of many of the inhab., who preferred Brit. rule. In the main the subsequent hist. of the O. F. S. was peaceful, but there was some fighting with the Basutos and, eventually, the ter. of the Basutos was conquered and incorporated in 1869 by the treaty of Aliwal N. into the O. F. S. The discovery of diamonds at Kimberley at this time and the consequent rush of diggers led

to a dispute with the Brit. Gov. over the boundary of the O. F. S., which was settled in 1876 by a convention signed in London providing for a payment by Great Britain of £90,000 in commutation of the claim of the O. F. S. This convention was signed by Brand, whose moderation and statesmanlike qualities as president had won general recognition. In 1889, not long after his death, the O. F. S. entered into an alliance with the S. African Republic, which was renewed in 1907, and this alliance was appealed to as binding the O. F. S. to assist the S. African Republic in her quarrel with Great Britain in 1898. The republic took a prominent part in the S. African war of 1899-1902, and was made a Brit. crown colony (Orange R. Colony) in 1900. In 1907 responsible gov. was granted, and in 1910 the colony was merged in the Union of S. Africa as the prov. of the O. F. S.

Native Administration.—In the O. F. S. the native pop. in the reserves was never large and, despite immigration, it is still far lower in proportion to Europeans than in any other prov. of the Union. Formerly there was a Dept. of Native Affairs, but it was abolished in 1908, when native administration was entrusted to the colonial secretary's dept. From the outset it gave no general recognition to native law, though, by a special enactment, it acknowledged the legality of native marriages in the Thaba Nchu reserve and, by later enactment, a limited system of intestate succession derived from Rom.-Dutch law was introduced. Three chiefs have civil judicial powers, and two of these have criminal powers as well, in the native courts. The Native Administration Act, 1927, which gave these powers, also gave statutory recognition to native law in all provs. of the Union. This, though it obviated embarrassment arising from the previous limited recognition, was really in harmony with the political objective of segregation, and was directed less to the maintenance of native law for its own sake than to differentiating its field. There are four Native Reserve Boards, whose nominated members sit under the chairmanship of a magistrate, and derive their resources from the local tax imposed by the Natives Taxation and Development Act. There are to-day only three small reserves, one comprising lands assigned to Mopeli, a Basuto chief who submitted during the Basuto war of 1865-66; the others consisting of the remainder of the lands which the Basuto assigned in 1829 to a section of the Barolong which had been driven out of Bechuanaland and then left in undisturbed possession by the Voortrekkers in consideration of help rendered by them against the Basutos. As in other provs. of the Union there is a complicated system of pass laws. The regulations under the Native Administration Act, 1927, require the native to take out a pass to enter or travel within any 'pass area,' i.e. anywhere within the O. F. S. and Transvaal excepting native areas scheduled under the Native Land Act of 1913. The rigidity of the system is, however, mitigated by the issue of

travelling passes by officials and owners of farms, and by the grant of exemptions. There are also in Bloemfontein and other large tns. 'locations' for natives. The 28,000 natives who live in the Bloemfontein location are said to live under as good conditions as any in the Union. The natives here have cinema shows, concerts, and meetings; a Y.M.C.A., a native dispensary, and an undenominational high school. There are also sev. well-laid-out sports grounds. It has been found that by establishing an advisory board, elected by the natives and to which all matters concerning the location are first referred, the natives have been brought to take a pride in the progress and orderliness of their native tn. See A. H. Keane, *The Boer States*, 1900; J. H. Malan, *Die Opkoms van die Republiek van die Ooskaapland van die Orange Vrystaat tot die Jaar 1863*, 1929; H. J. Wikar, *Journals*, 1935; and E. A. Walker, *History of South Africa*, 1935.

Orange, House of, ruling family of a once independent principality now included in the dept. of Vaucluse, France, and to-day occupying the throne of the Netherlands (*q.v.*). The male line of Gerald Adhemar (*fl.* 1086) ended in 1174 when the heiress married Bertrand de Baux. Nine princes of his line followed one another until another heiress, Marie de Baux, married Jean de Châlons in 1393. His descendant, Philibert (1502-30), was an able soldier and for his part in the campaign of Charles V. was rewarded by the emperor with extensive possessions in the Netherlands. Philibert, dying without issue, was succeeded by his nephew, René of Nassau-Châlons, whose father, Henry, count of Nassau, had also enjoyed the emperor's confidence. René on his death in 1544 devised his titles and estates to his first cousin, William of O. Nassau, famous in hist. as William the Silent. The prince of this line rendered service to the cause of Dutch independence but still greater service to the Protestant cause. William the Silent was assassinated in 1584. His great-grandson became William III. of England; but on his death in 1702 the succession was disputed by the king of Prussia and John of Nassau-Dietz. The peace of Utrecht (1713) effected a compromise. The Prussian claim was abandoned, the ter. of O. was incorporated in France, and John was given the title prince of O. In 1815 his descendant, William VI., became king of the Netherlands. See Count A. de l'ontbriant, *Histoire de la principauté d'Orange*, 1891, and J. M. van de Venne, *Geslachts-register van vorstenhuis Nassau*, 1937.

Orangemen, members of the Orange Society, known also as 'Orange boys.' From the time of the Elizabethan settlements in Ireland there was bitter enmity between Catholics and Protestants. This feeling smouldered during the seventeenth century, but the events connected with the revolution of 1688 fanned it to a furious flame. During the whole of the eighteenth century Ulster in particular was kept in a continuous state of uproar by this semi-religious, semi-political feud

In 1795, when the Protestant party was in the ascendant, the Orange Society was formed, taking its name from William of Orange. The society was avowedly political, its aim being to secure Protestant ascendancy wherever possible. It was a secret society, arranged in lodges; and during the last century it spread widely, having lodges not only in Ireland but also in Great Britain and the dominions, especially Canada. The organisation has always had a tendency to bluster and riot, so much so that Parliament has several times been compelled to restrain it somewhat. From 1813 to 1828 it was entirely suspended in its native land. It keeps as high festivals the anniversaries of the battle of the Boyne (July 1) and the battle of Aughrim (July 12). See *Orangism Exposed* (anonymous, 1824, New York); Parl. Report on the Orange Association 1835; Lilburn, *Orangism*, 1866.

Orange River, or **Gariiep**, riv. of S. Africa, rising in the Mont aux Sources, Drakensberg, Basutoland, and flowing generally W. to enter the Atlantic in lat. 28° 38' S. It forms the N. boundary of Cape of Good Hope, separating it from the Orange Free State, Griqualand W., Brit. Bechuanaland, and Great Namaqualand. The chief tribes are the Vaal and Caledon on the r. b., and the Hartebest and the Zeekoe on the l. b. Its banks are well wooded, but much of the country through which it flows is desert. It is of little use for irrigation owing to the depth of its channel, and sand-bars, shallows, rapids, and falls make navigation impossible. Length 1100 m.

Orango, Doroteo, see VILLA, FRANCISCO.



ORANG-UTAN

A, Right hand. B, Foot.

Orang-utan, or **Orang-utan** (*Pongo pygmaeus*, or *Sinua satyrus*), member of the family Pongidae or Simiidae, which is found solely in Borneo and Sumatra. In colour it is tawny, and in height averages

about 4 ft. The brachycephalic condition of the head is very marked, the fore-limbs touch the ankles when the animal is erect, both hallux and pollex are short, and the former is usually devoid of a nail; the dorsolumbar vertebrae are sixteen in number. The O. is arboreal, and when on the ground it walks on the outside of its feet. During the night-time it sleeps in a nest which it builds in the trees. In habit it is solitary except during the pairing season, and in diet it is mainly frugivorous. See Winifred Felee, *Apes*, 1948.

Oranienbaum, in. in the Leningrad region of the R.S.F.S.R. on the S. coast of the gulf of Finland, 25 m. W. of Leningrad. It is a favourite summer resort, and contains a former imperial palace. Pop. 6000.

Oratorio, dramatic form of religious music consisting of solos and choruses, with instrumental accompaniment. The term, however, has been variously defined at different periods in different countries, and, in its beginnings, in the early seventeenth century, it had action, scenery, and costumes, while, sometimes, works not religious in character, have been called Os., evidently because they consisted of the solo, choral, and orchestral features of O. proper while yet not being operas, in that they were not intended for stage performance. Dr. Scholes points out that some quite modern Os., such as Berlioz's *Childhood of Christ* and Liszt's *St. Elizabeth* have been found capable of treatment in dress and action like operas and indeed of being staged as such.

The origin of both the name and the form is usually traced to the oratory of St. Philip Neri. About the middle of the sixteenth century this saint commenced a series of biblical lectures at the oratory. In order to make these more interesting, Annunziata, the master of the papal chapel, wrote settings for hymns, *Lauds spirituali*, to be interspersed throughout the lectures. It is probable, however, that the origin of the O., in Germany at least, is connected with the hymns and songs of the old miracle and mystery plays, and also with the usual method of singing the Passion gospel during Holy Week. The first It. O. was Emilio de' Cavalieri's *Rappresentazione di anima e di corpo* (1600), which shows the very close affinity between the O. and the opera. Both were founded on the monodic system of harmony, and to this system the It. school adhered. The name of Carissimi (d. 1674) is particularly important as a developer and exponent of the It. O. One of his Os., *Jephtha*, is founded partly on the scriptural story of Jephtha's sacrifice of his daughter, but it has also several rhymed passages for solo and chorus, and a narrator in the manner of a Bach Passion. In Germany the O. was from the beginning written round the Passion, the first example being Steffani's *Passio secundum Mattheum* (1670). There is no successor, however, for over fifty years. Heinrich Schütz's (1585-1672) settings of the Passion prefigured Bach but they also have their own high value in addition (Scholes). The Ger. school did not follow

the It. in its monodic method, but worked almost invariably in the polyphonic style of composition. The form was raised to a great height by Bach (1685-1750), whose greatest composition of this kind appeared in 1729, the *Passion according to St. Matthew*. Only one O. is attributed to Wagner, an early, unimportant work, *The Love Feast of the Apostles* (1843), written for male choir. Dvořák's *Stabat Mater* is the only important Czech O. Beethoven's one O., *Christ on the Mount of Olives*, contains a famous 'Hallelujah' chorus. The most prolific composer of O. during the eighteenth century was Handel, who first wrote in Ger. and later in It. His best Os., however, belong to his Eng. period, the most famous being *The Messiah* (1741). Other well-known Os. are Bach's *St. John Passion* (1720); Haydn's *Creation* (1798), and *Seasons* (1801); Spohr's *Last Judgment* (1812); Mendelssohn's *St. Paul* (1838) and *Allyah* (1838-48); Stainer's *Crucifixion* (1887); Elgar's *Dream of Gerontius* (1900); and Walton's *Belshazzar's Feast* (1931).

An historical list of Os., indicating importance and influence on development of form will be found at the end of the article on O. in P. Scholes's *Oxford Companion to Music*, 1941. See also Annie W. Patterson, *The Story of the Oratorio*, 1902.

Oratory, art of rousing the emotions and convincing the understanding of others by public speech according to the rules of rhetoric. It may be classified as political, forensic, and religious. The ancients experienced no strong religious passion, so that their O. was confined to the courts and the legislative assembly. Before Demosthenes the prin. orators of Athens were Lysias and Isocrates. The speeches alleged to have been delivered by Pericles and recorded by Thucydides are probably the composition of the historian; yet some of them remain among the most moving utterances of hist. Demosthenes stands apart from and above all others. An eclectic in style, he achieved a synthesis which makes him still the leader of human eloquence to whom alone of the Athenians Alcibiades yields the palm of O. At Rome the rugged eloquence of Cato, the Scipios, and the Gracchi gave way before the Attic influence. It has been said that a certain oriental strain marred the speeches of Hortensius; but the great forensic orations of his rival Cicero rank with, and, in the opinion of some, even surpass, the achievement of Demosthenes.

As at Athens, so at Rome, the end of freedom marks the decay of eloquence. After the extinction of Imperial despotism two causes hindered the rebirth of O. There was a lack of political and legal institutions which have always been the nursery of eloquence, and language itself was undergoing a long and difficult transformation.

The Eng. language together with the parl. tradition and the hallowed dignity of the Eng. courts have fostered a high standard of O. The names of Lord Chatham, Pitt the younger, Charles Fox, Lord Brougham, Disraeli, and Gladstone adorn the eighteenth and nineteenth cen-

turies; and the splendour of their debates was enhanced by the speeches of their Irish colleagues Edmund Burke, Henry Grattan, Richard Shiel, and Daniel O'Connell. In France the voices of Mirabeau, Desmoulins, and Danton heralded and sustained the revolution. The twentieth century has experienced a decay of culture; and this decay has been marked by a lack of orators to interpret and control the portentous happenings of these fifty years. Two notable exceptions have been the impassioned demagogy of Adolf Hitler and, more important, the parl. and broadcast speeches of Winston Churchill during the Second World War. These swayed the destiny not of a single nation but of the world. Eng. forensic O. has enjoyed an equal splendour and suffers a similar eclipse. The eloquence of Henry Hawkins, Edward Carson, Rufus Isaacs, and F. E. Smith remains the glory of the Eng. Bar and Bench. Religious O. reached its perfect flower in France. St. Bernard of Clairvaux and Jean Gerson dominated the pulpit in the Middle Ages. The semi-political wranglings of the reformers were not fertile ground for the selfless passion which inspires the great pulpit orator; but from the seventeenth century onwards there arose a succession of preachers who, independently of the religious content of their discourses, rank with the finest speakers of the world. Bossuet, Bourdaloue, Fénelon, Massillon, and Lacordaire have no equals as exponents of the Christian faith and the duties of the Christian life. See J. Hardwick, *History of Oratory*, 1896.

Oratory of St. Philip Neri, Congregation of the, was founded in 1556 at the hospital of San Girolamo della Carità, Rome, by the saint whose name it bears. The society had at first no definite rule; but after the death of St. Philip a constitution conformable to his spirit and intention was drawn up by the historian Baronius, one of his earliest companions. The Oratorians are priests living in community under simple vows terminable at any hour. The Oratory was introduced into England by Newman in 1847, the first house being at Maryvale, near Birmingham, later transferred to Birmingham itself. The Brompton Oratory is an independent offshoot of this.

Another oratory was founded in 1611 by Cardinal de Bérulle, and called the Congregation of the Oratory of Our Lord Jesus Christ. The general intention was to strengthen eccles. discipline, and the rule was also adopted by the Oratory of the Immaculate Conception, founded in 1852 in Paris. See also ORATORIO. See J. E. Bowden, *Life of Frederick William Faber*, 1869.

Orbigny, Alcide Dessalines d' (1802-57). Fr. naturalist, b. at Couëron, Loire-Inférieure. He was appointed travelling naturalist to the Museum of Natural Hist., Paris; and in 1826-34 went on a scientific mission to S. America, embodying the results of his researches in zoology, paleontology, and ethnology in *Voyage dans l'Amérique méridionale* (1839-43). Among his other works were *Galerie ornithologique*

des oiseaux d'Europe (1836-38); the unfinished *Paléontologie française* (1840-54); and *Prodrome de paléontologie stratigraphique* (1850-52).

Orbis Sensualium, see COMENIUS.

Orbit, path traversed under the influence of gravitation by a heavenly body round its primary. In the solar system ellipses are traced by satellites round their planets, and by planets round the sun, the primary occupying one of the foci. The elements provided when an O. has been computed are the long. of perihelion, the long. of the ascending node, the inclination of the O., the eccentricity, the semi-axis major or mean distance, and the time of perihelion passage. The planetary Os. vary in eccentricity from 0.007 to 0.25, those of satellites from 0 to 0.21. Periodic comets move in elliptical Os. from about 0.46 to 0.9999 eccentricity; most comets move in nearly parabolic paths, while sev. trace a hyperbola. But all of those formerly moved in elliptic Os., and were thrown into hyperbolic Os. by the perturbations of the major planets. Spectroscopic binaries have less eccentric Os. than telescopic ones, the values ranging from about zero (implying nearly circular motion) to 0.67.

Orbilius, Pupillus, see PUPILLUS.

Orkades, Lat. for Orkney Is.

Orsagna, or L'Arsagnuolo (c. 1308-c. 1368), nickname (the archangel) of Andrea di Cione, Florentine painter, sculptor, and architect. His work is rich in colouring and ornamental in effect, though rather hard and conventional in execution. Among his masterpieces are the wall paintings in fresco and an altar-piece in the Strozzi Chapel, Santa Maria Novella, Florence; the frescoes in the Campo Santo at Pisa; the altar-piece in tempera, 'The Coronation of the Virgin' (National Gallery, London); and in architecture, the church and tabernacle of Or San Michele, Florence. He left sev. unfinished works, completed by his brothers.

Orchā, Orchha, or Urechha, state of the United State of Vindhya Pradesh, India. Iron and diamonds are produced. The cap. is Tehri. Pop. 363,000.

Orchard, large or small plantation of fruit trees. Modern Os. consist of 'straight' plantings of apples, pears, plums, and cherries. The plantation layout for mixed varieties, except for small garden Os., has been discarded. Best soils for fruit are of a loam character, with certain types of sands or clays for second choice; no fruits do well in soils subject to waterlogging or drying out. For apples, deep, sandy, gravelly, or clayey loams, with good draining subsoils, are best. For pears, medium to heavy loams. Plums do best on heavy to medium loams, and are more tolerant of wet soils than other fruits. Cherries like medium to light loams, and deep, well-drained soils. Soft fruits are less exacting and thrive on most soils, given adequate organic matter content. Land sloping to the S., W., or N. is preferable to that sloping to the E. Protection by windbreaks, natural or made, is needed on land fully exposed to the S.W. Maximum sunlight in summer

is essential. Elevation is important. High land is generally preferable to low, but the crucial factor is the movement of air currents. An O. should be sited and planted so that the heavy cold air can move through it easily to lower levels beyond. Frost pockets and narrow valleys should be avoided. A minimum rainfall of 20-25 in. per annum is needed for fruit crops. It is no longer good practice to plant Os. with 'filler' trees to be taken out some years later, and undercropping of tree fruits with bush fruits needs careful planning. A modern O. is planted for permanency from the start. Where circumstances dictate mixed plantings gooseberries may be planted with apples, black currants with plums, cherries with plums, but not apples with plums or cherries, since soil and manurial requirements must be similar. Plums or damsons may be planted on the windward side of Os. Raspberries, strawberries, and brambles are planted separately. Five systems of planting prevail: square, rectangular, diagonal, quincunial, and hexagonal. Spacing depends on type and habit of tree chosen. Gooseberries and currants may be planted at 6 ft. apart (1210 trees per ac.); bush apples and pears at 12 ft. apart (302 trees per ac.); half-standard apples, pears, and plums at 24 ft. apart (75 trees per ac.); and full standard tree fruits at 30 ft. apart (48 trees per ac.). Land for fruit should be deeply ploughed, and the subsoil broken up if hard and panned. No manure is necessary for tree-fruit planting, except potash on light or deficient soils. Soft fruits should have dung or compost ploughed or dug in before planting. If drainage is needed drains should be laid after the orchard has been laid out, but before trees are planted. Drains should run between the rows of trees into the main drain. Actual planting is done in dry open weather from about mid-Oct. onwards, but is best completed before Dec. Planting holes should be 9-12 in. deep, and 24-36 in. in diameter for tree fruits. Subsoil is broken up with a fork, then a little top soil put back so that the tree is planted in good top soil entirely. Firm planting is vital, but ramming of the soil, particularly clays, is undesirable. All trees need staking; bush trees can be staked with stakes driven slantwise, pointing into the prevailing wind, standards and half-standards are best given two stakes about 18-24 in. apart on each side of the tree, with a cross-pole fastened to the tree, 12 in. below the branching head. The O. floor should be cultivated and kept free from weeds and grass until tree growth is well developed.

Grass orchards are less popular. Although stock such as poultry and sheep can be run under half-standard or standard trees, manurial treatment tends to become unbalanced. Grass has a starving effect on tree growth, and Os. should not be planted direct in grass. When trees are well developed it is permissible to allow grass to grow over the roots, but it should be kept short by cutting or grazing with stock, and careful attention given to manuring and fertilising of trees.

Sheep suit fruit best, as their excrement has a high potash content; geese are excellent, then poultry; pigs and cows are less suitable, since their excrement is less evenly distributed. Overstocking should be avoided, and the land rested from stock and limed periodically. Temporary cover-cropping of Os. with leguminous seed mixtures is helpful in building up organic content of soil. Intercropping of fruit with vegetables is apt to be handicapped as it interferes with spraying programmes. Good regular yields of fruit depend largely on manuring. Broadly, dessert apples, red currants, and gooseberries need potassium mainly, supplemented by nitrogen and phosphorus; cooking apples, pears, cane fruits, and strawberries require potassium, but heavier supplements of nitrogen; while stone fruits, black currants, and nuts need plentiful nitrogen and moderate amounts of potassium and phosphorus. In practice, manuring must be related to pruning, cultivating, soil, drainage, and type and variety of fruit and tree.

Orchard House.—A lean-to or span-roof glasshouse for the culture of fruit trees in pots should preferably be not less than 20 ft. wide, 12 ft. high at the ridge, and 6 ft. at the side. All sides should be made to open panel-wise for tree ventilation. Sufficient heating to nullify spring frosts in March–April is desirable. Pot trees can provide a greater variety of fruit from a given space than outdoor trees. Fruit ripens one to two weeks earlier. Success depends upon management and attention to watering, syringing, top dressing, and feeding to maintain health and fertility. Apricots, figs, nectarines, and peaches can be kept constantly in the house. Apples, pears, and plums can be placed out of doors in a favourable situation from early June to early Feb. Currants, gooseberries, and cherries are best cropped under glass, and then put outside until early Feb. Trees should have been grown in pots from the time they were grafted or budded, and should be three to four years old, well furnished with fruit buds. Size of pots are 12–16 in. Trees are grown in a compost of 1 part by bulk each of coarse sand, leaf mould, rotted manure, mortar rubble, and 5 parts medium loam, plus 12 oz. bone meal and 6 oz. of a balanced fruit fertiliser to every barrowful of compost. Repotting is done in mid Oct., but is not necessary every year. Healthy trees need only a little old soil removed from the surface and sides, and replaced with fresh compost. Trees are wintered out of doors after watering well, and plunging to the rims of the pots in ashes. Pots are then covered with organic litter to keep frost out. In Feb. trees can be moved into the house. Indoor trees usually need pollinating by hand, using a rabbit's sent or camel-hair brush when flowers are open. Fruits should be well-thinned, and all fruit trees in pots need careful pruning. Apples, pears, cherries, currants, and gooseberries are summer-pruned. In the case of nectarines, peaches, and plums, main shoots are cut back by one-half and laterals to two to three buds of their base.

Orchardson, Sir William Quiller (1835–1910), Brit. artist, b. in Edinburgh. He first exhibited at the Scottish Academy in 1848. In 1862 he settled in London, where for some time he worked in close association with John Pettie. He was elected A.R.A. in 1868, and in 1877 made R.A. In 1870 he visited Venice. He was made a D.C.L. of Oxford in 1890, and knighted in 1907. His work, usually dealing with incident, is dramatic, elegant, and harmonious in colouring. Among his best-known pictures are 'Challenged' (1865); 'Ophelia' (1874); 'A Venetian Fruit-seller' (1874); 'Plots and Jests' (1876); 'The Queen of the Swords' (1877); 'Hard Hit' (1879); 'Napoleon on board the *Bellerophon*' (1880); 'The Young Duke' (1889); and 'Her Mother's Voice' (1888). He was also a popular and successful portrait-painter.

Orchestra, body of instrumental players performing in a theatre or concert hall. The term originally meant the semi-circular space in front of the stage in the ancient theatre where the chorus danced and sang; it has been transferred from the place to its occupants. The modern O. did not begin to evolve till about 1600. At that period the same music was performed by voices and instruments; many books of madrigals are described as fit for viols or voices. The small instrumental groups were generally confined to the same family, e.g. the consort of viols or recorders, and they played what we should call chamber music. Wind bands existed, and trumpets and drums for military and ceremonial use. There were no public concerts before the eighteenth century; the O. developed in the theatre, the church and the court (Louis XIV. of France kept a band of twenty-four violins, imitated by Charles II. of England). Of these the theatre was the most important because it encouraged experiment. In his opera *Orfeo* (1607) Monteverdi used an O. of forty (seventeen strings, eight woodwind, nine brass, harp, two harpsichords, and three organs), and put orchestral colour deliberately at the service of dramatic effect. About the same time Giovanni Gabrieli at Venice extended the antiphonal principle from vocal to instrumental music, and wrote works for two groups of instruments (or Os.), contrasting the sonorities of strings and brass. But progress was not consistent. By 1700 the violin family had replaced the viols, and the centre of the O. became the string quartet (two violins, viola, and cello). It was always supported by a keyboard instrument (generally harpsichord or organ), which played the bass line and added any harmonic filling required. The keyboard player, who was often the composer, directed the performance (there was no conductor in the modern sense); next in importance were the leaders of the first violins and the basses, who took their position beside the keyboard. Oboes, bassoons, and flutes (more strictly recorders) won a place in the O. of Purcell (1659–95) and Lully (1632–87), and trumpets and drums were introduced for special effects; but the wind instruments

often had little to do except reinforce the strings, and flutes and oboes were generally played by the same players. The period of Bach and Handel saw the rise of the concerto, and the use of one or more solo instruments, either in contrast to the main orchestral body or to supply an *obligato* in a vocal work. The operas and oratorios of Handel not only introduced many additional instruments including trombones, transverse flutes, horns, and clarinets, besides several that failed to keep their place, but explored

the valve to horns and trumpets greatly extended their chromatic range and the power of the whole O. During the romantic period Os increased rapidly in size, and composers turned more and more to exploit the mounting possibilities of instrumental colour. This process reached its height in the works of Berlioz and Wagner who himself added a number of new instruments, and was carried to excessive lengths by Strauss and Mahler. In France special prominence was given to the cornet (taken from the military



BBC

BBC SYMPHONY ORCHESTRA

Leader, Paul Beard, Conductor, Sir Adrian Boult.

fresh ground in orchestral sonorities. The modern O did not emerge till about 1800 when the keyboard player dropped out and the instruments became standardised in their three groups of strings, woodwind and brass supported by percussion. The first violinist was now the true leader of the O. In addition to pairs of flutes, oboes, clarinets and bassoons two (occasionally four) horns had been introduced from the hunting field and in Beethoven's Fifth Symphony the three trombones completed their transition from the church to the concert hall via the theatre. Big drum, cymbals and triangle were used for special effects (known as Turkish music), so was the piccolo and a little later the cor anglais while the harp was turned from long exile. The wind bass was supplied by the serpent, ophicleide or double bassoon and from about 1860 by the tuba. In 1815 the application of

bind) and the instruments of the saxophone family. Perhaps the most laborious and nicest O is that used by Stravinsky in his *Sera du Temps* (1913). Since then there has been a movement led in part by Stravinsky himself in favour of smaller Os. Experiments have been made in the introduction of electric instruments such as the Ondes Martenot (q.v.).

To the growing complexity of the O is due the rise of the modern conductor a nineteenth century phenomenon developing out of the violinist leader. The first to conduct with a baton in London was Spohr in 1790. Weber in 1826 used a roll of paper, and others a violin bow. The interpreter conductor was largely the creation of Wagner. In earlier times a heavy baton had sometimes been used simply to beat time (I fully died as a result of injuring his foot with one). Early in

the nineteenth century control of orchestral music began to pass from the court to the middle classes, and public concert societies were founded. The Leipzig Gewandhaus already existed; the London Philharmonic Society was founded in 1813, the Paris Société des Concerts du Conservatoire and the Munich Odeon-Concerte in 1828. Many others followed. The number of permanent Os. increased rapidly after the middle of the century, especially on the continent and in the U.S.A. Until this century Britain was backward in this respect, but is now well supplied by the London Symphony, London Philharmonic, Royal Philharmonic, and the various Os. associated with the B.B.C., besides a number of prov. Os., of which the Halle in Manchester is the most distinguished. Promenade concerts began in Paris in 1833, and were transferred to London in 1838, where they flourished from c. 1840 to 1859 under Louis Jullien. Revived in 1895 at the new Queen's Hall by Henry J. Wood and Robert Newman, they have ever since been a strong influence in entertainment and education. An even greater influence has been the dissemination of orchestral music by gramophone and radio. The standard of instrumental performance expected (and achieved) in the last fifty years has shown a continuous rise. See A. Caroe, *The History of Orchestration*, 1925, C. Forsyth, *Orchestration*, 1936, *The Orchestra in the Eighteenth Century*, 1940; and *The Orchestra from Beethoven to Berlioz*, 1949.

Orchids (Orchidaceae), family of monocotyledonous plants of extensive distribution, though most abundant in damp equatorial regions. The known economic uses of its members are remarkably few and, indeed, are confined to the genus *Vanilla* (the dried pods of which yield the flavouring substance of that name), and to the genus *Orchis*, from the tubers of some species of which saleg, a nutritious drink, is or used to be derived. In Britain the family is represented by some fifteen genera, among which are *Aeolaea* (bird's-nest orchid); *Listera* (twayblade); *Spiranthes* (lady's tresses); *Epipactis* (helleborino); *Orchis*, represented by twelve species, some of which are common; *Aceras* (man orchid); *Ophrys* (insect orchid); *Hermidium* (musk orchid); *Habenaria* (butterfly orchid); and *Cypripedium* (lady's slipper). These are all terrestrial, and most of them, though small and not so brilliantly coloured as the tropical species, are pretty and interesting, and, with a few others from temperate climates, are grown in rock gardens and in shady borders or as pot plants in cold frames. Apart from these, a considerable number of O. can be grown with ease in a small greenhouse; and many choice, though of course not rare, varieties are procurable at small expense. For further particulars, see the various genera under their own names: Darwin's absorbing book, *The Fertilisation of Orchids*, 1862; J. Veitch, *Manual of Orchidaceous Plants cultivated under Glass in Great Britain*, 1887-94; W. Watson, *Orchids, their Culture and Man-*

agement, 1903; W. H. White, *The Book of Orchids*, 1902; J. O'Brien, *Orchids* (undated); J. Lindley, *Genera and Species of Orchidaceous Plants*; C. F. F. K., and L. L. Sander, *The Orchid Guide*, 1927; T. W. Hirscoe, *Orchids for Amateurs*, 1948; and J. Brooke, *The Military Orchid*, 1948.

Orchil, or Orchella, see ARCHIL.

Orehomeus, two cities of anct. Greece: (1) In Boeotia, on R. Cephissus. (2) In Arcadia, lying N. of Mantinea, W. of Stymphalus. Both were important till the fifth century B.C.

Oreus, Lat. mythology, one of the names of the nether world and its god, corresponding to Hades and Pluto respectively. Orzy, Baroness, otherwise Emmuska Barstow (1865-1947), Brit. novelist, b. at Tarnaörs, Hungary, daughter of Baron Tarnaörs. She studied painting in London, and exhibited at the Royal Academy. In 1895 she pub. her novel, *The Scarlet Pimpernel*, first written as a play in collaboration with her husband, Montague Barstow, son of a Yorkshire clergyman, and followed this with more than forty novels of a similarly romantic character, chiefly of the period of the Fr. Revolution, including many 'Pimpernel' sequels, such as *The Elusive Pimpernel* (1908), most of which had a great vogue. Her writings included essays, historical novels, detective stories, and memoirs, *Links in the Chain of Life* (1947).

Ordainers, Lords. As part of the long-continued struggle between the Eng. barons and the Eng. kings, in 1310 a Parliament of the former set up a body of twenty-one peers, the Lords Ordainers, in an effort to control Edward II. After eighteen months' office they put forward proposals for future government, known as the 'ordinances' of 1311.

Ordeal (O.E. *ordāl*, *ordāl*, judgment; cf. Ger. *urteil*), or Judicium Dei, very common medieval method of deciding doubtful questions. It is not an isolated phenomenon, for in all parts of the world such appeals to magic are common, and many close analogies to the medieval methods may be found. It will be possible here to deal only with the medieval forms. Trials were generally made by boiling water, by red-hot iron, by cold water, by fire, or by blessed bread (the *corameli*). In the trial by boiling water the accused person was made to plunge his hand, and sometimes his arm, into boiling water, and perhaps take something from the bottom of the vessel. The hand was then sealed up, and his guilt or innocence was judged by its condition at the end of three days. The O. by red-hot iron was performed either by carrying a red-hot iron a certain number of paces or by walking barefoot over or between red-hot ploughshares. Well-known examples of this type of O. are those which vindicated Queen Emma (mother of Edward the Confessor) and St. Kunigunde. In the trial by fire the accused had to justify himself by walking between two fires of wood placed close together. Here, again, a certain number of days was allowed for recovery. In the O. by water the accused was bound and

thrown into cold water. If he sank he was innocent, but if the water refused to receive him he was guilty. This long remained a favourite test of witchcraft. the O. by blessed bread depended upon the belief that a perjurer could not swallow such food. Henry III. abolished legal Os in England, except trial by battle, which theoretically remained in force until 1818, when it was brought to an end on the occasion of its claim by a man indicted for murder.

Orden, El, *see* NEW DOVGOLA.

Order, in taxonomy (classification of plants and animals) refers to a group below class and higher than family. It is therefore formed of a number of families which are a div. of a class, e.g. the O. Carnivora belongs to the class Mammalia and includes such families as Canidae (dogs) and Felidae (tigers and cats). *See* BOTANY, ZOOLOGY, etc. O. is also a term in architecture (q.v.).

Ordericus Vitalis (1075-c. 1142), monk and historian. b. at Atoham, Shropshire. St. Evroul, a Norman monastery, was his home for most of his life. His *Historia Ecclesiastica* (1123-41), dealing with England and Normandy, contains some important contemporary hist. It was ed. by L. Duchesne in 1819, and by A. le Prévost for the Société Historique de France in 1838-55, and trans. into Eng. by T. Forester in 1853-56.

Order in Council, order issued by the sovereign by and with the advice of the Privy Council. The O. in C. is the chief constitutional instrument through which the Crown can increase the residue of its prerogative authority (*see* CROWN), and is perhaps the sole remaining mode by which the Privy Council can exercise such legislative powers as still subsist in it. But apart from the royal regulations for the army and navy, and legislation for Crown colonies (q.v.) and protectorates (q.v.), Os. in C. are, in practice, only made subject to the assent of Parliament, or in pursuance of express statutory powers conferred on the Crown. Legislation by Os. in C. is, nevertheless, authorised by a host of statutes. The provisions of the Extradition Act are applied by Os. in C. to the states with which Great Britain has concluded treaties, and the O. in C. is the orthodox mode of creating courts for the trial of Brit. subjects in barbarous countries in pursuance of powers conferred on the Crown by the Foreign Jurisdiction Act, 1890 (q.v.). As most of the business formerly transacted by the Privy Council has now been assigned to the various gov. depts., Os. in C. so far as they do not relate to the Crown's discretionary authority (prerogative), are drafted by the different ministries or depts. concerned, while the Cabinet itself determines the general policy of such Os. in C. *Halsbury, Laws of England.* In cases of emergency constitutional limits have been disregarded, and Parliament has been subsequently asked to ratify the action by granting an indemnity to those issuing the O. in C.

Orders, Army. The king's regulations and O. for the Brit. Army which were

formerly notified in army circulars, have, since 1888, been promulgated, together with General O. under the title of A. O. The Crown has always issued regulations and O. for the government and general economy of the military forces, in execution of statutory provisions relative thereto; but such O. would not be enforced by the law if in any way *ultra vires*, e.g. if they purported to affect persons not subject to military law (*see* as to this under MARTIAL LAW). A. O. are issued to the Army Council nominally by the command of the sovereign as expressed under the sign manual. Details relating to appointments and promotions, pay, uniforms, etc., or other special matters, are dealt with by royal warrants issued through the War Office.

Orders, Holy. The Church of England, in the preface to her ordinal, insists on the necessity of the apostolical succession and the threefold ministry. These three O. are bishops, priests, and deacons, who are set apart for their office by the laying on of the bishop's hands and the invocation of the Holy Ghost. The Church of England is therefore unable to recognise any but episcopal ordination. The Rom. Church, however, while holding to the same principle of apostolic succession, refuses, for technical reasons, to accept the validity of Anglican ordination. In the Rom. Catholic Church there are also certain minor O. of little practical importance, those of acolyte, exorcist, reader, and doorkeeper. Among Presbyterians ordination is performed by the presbyters, while many other Protestant bodies have no form of H. O. whatever. *See* ORDINATION.

Orders, Monastic, *see* under MONASTICISM.

Orders of Knighthood. Origin and hist. of knighthood generally has been treated in the article KNIGHTHOOD. This article relates principally to the different O. of K. of the various nations of Europe.

GREAT BRITAIN AND IRELAND: (1) *The Order of the Garter*.—Selden, corroborated by Froissart, fixed the date of the foundation of this anct. order as 1345; but, in the absence of all authentic records, both the date and the cause of foundation rest upon mere tradition. The register known by the name of the Black Book, which is usually referred to as treating of the order from its very foundation, was only drawn up in its present form towards the middle of the fifteenth century. Burke, commenting on Froissart's statements, says that the old chronicler vividly conjures up the whole scene of the origin of the order with his naïve and vivid account of how Edward III. resolved to re-erect Windsor Castle, the scene of dramas of King Arthur and the Round Table, and to make an order of knights of himself and his children, to be called the Knights of the Blue Gar. * and that an ann. feast of the order should be solemnised at Windsor on the day of St. George. Popular tradition has the different version, derived from the romantic episode narrated by Polydore Vergil, of the countess of Salisbury's garter dropped at a court festival and

picked up by the king himself, who, observing the general significant smile of the onlookers, tied it round his own knee and uttered the celebrated words: 'Honi soit qui mal y pense.' Burke is not disposed to discountenance this story, characteristic as it is of an age steeped in the romance of gallantry. A third theory is that of Camden, the antiquary, who says that the order originated at the battle of Crécy, when Edward ordered his garter to be displayed as a signal for the onset. In any case, there is no more ant. or illustrious order in Europe. It had undergone many changes before the Act of 1805, when its constitution was fixed as comprising the sovereign and twenty-five knights companions, together with such lineal descendants of George III. as might be elected. Its statutes have at different times provided for the admission of

'in the time of which there appeared in the heavens a white cross in the form of that upon which the apostle Saint Andrew suffered martyrdom.' The order is under the especial tutelage of St. Andrew. It fell into desuetude after the abdication of James II., but was revived in 1703 by Queen Anne. The insignia are the star worn on the left side of the coat, consisting of a St. Andrew's cross of silver embroidery, in the centre of which is a thistle of green in a field of gold, surrounded by a circle of green bearing the motto 'Nemo me impune lacessit' ('No one provokes me with impunity,' the motto of all the Scottish regiments, and generally rendered in the vernacular, 'Wha daur meddle wi' me?'), the collar of thistles intermingled with sprays of rue, and the badge worn pendant-wise and tied under the arm, consisting of a figure of St. Andrew, in gold enamel, with green gown, bearing before him the cross, enamelled white, the whole environed with rays of gold in the form of a glory. By a statute of 1827 the order is to consist of the sovereign and sixteen knights.

(3) *The Order of St. Patrick*.—The national order of Ireland, founded by George III. in 1788. It was formed on the model of the Garter, and named after the Irish patron saint. The motto 'Quis separabit?' was assigned to it by the king in order to cement the harmony which the king is said to have been anxious to foster throughout the dominion. The insignia are the star of the cross of St. Patrick on a field argent, charged with three imperial crowns within a circle of azure, containing the motto above noticed. The order now consists only of the sovereign and about a dozen knights, including princes of the royal blood.

(4) *The Order of the Bath*.—Founded traditionally in 1399 by Henry IV., revived by George I. in 1725. It differed from the *Knighthood of the Bath*, that more ant. order, admission to which was characterised by various ceremonies, the chief being that of bathing, and which form seems to have died out at the coronation of Charles II., but to have been revived and combined with the newer order into a regular military order. There were to be originally, in addition to the sovereign and a prince of the royal blood, only thirty-five knights; but eventually, to commemorate the termination of the Napoleonic wars, the numbers were increased and divided into three classes; and again, in 1847, it was further extended by the addition of civil knights commanders and companions. The first class is comprised of knights grand cross (67 military, 29 civil, excluding distinguished foreigners honoured by the king); and the second, knights commanders (161 military, 112 civil, exclusive of foreigners); the third, companions of the order (702 military and 368 civil). The prin. insignia of the military classes are a gold Maltese cross with the inscription 'Ich dien,' gold collar of nine imperial crowns and eight roses, thistles, and shamrocks issuing from a sceptre; of the civil classes, a silver star of eight rays, charged with



THE STAR OF THE GARTER

sovereigns and extra knights, the latter of whom have always become part of the twenty-five companions on the occurrence of vacancies. Since 1917 membership of the order is again at the sole discretion of the sovereign without reference to the Prime Minister. The habit and uniform are the garter of dark blue ribbon, edged with gold, bearing in golden letters the motto above-mentioned: with chased gold pendant and buckle, blue velvet mantle lined with white taffeta, and a star on the left breast; crimson velvet hood and surcoat, black velvet hat with plume of white ostrich feathers and a tuft of black heron's feathers fastened in by a band of diamonds; gold collar with twenty-six pieces, each in the form of a garter, and the figure of St. George slaying the dragon attached to it.

(2) *The Order of the Thistle*.—Burke, ignoring the fabulous antiquity ascribed to this order by tradition, traces its organisation as a knightly confraternity to the reign of James II., but mentions the fact that the royal warrant issued prior to the promulgation of the statutes relating to the order refers to the alleged institution of the order by Achaian, king of the Scots, to commemorate a victory obtained by him over Athelstan, king of the Saxons,

three imperial crowns, surrounded with a red circle in which is the same motto; a badge of gold with the same emblematic rose, thistle, and shamrock.

(5) *The Order of St. Michael and St. George*.—Founded in 1818, not long after the cession of Malta to Great Britain and the submission of the Ionian Isles to Eng. protection, for the purpose of honouring the most meritorious of the Maltese and Ionians, and also such Brit. subjects as had distinguished themselves in the Ionian Is. or Mediterranean. William IV. ordained that it should consist of knights grand cross, knights commanders, and cavalieri or companions, to the number of fifteen, twenty, and twenty-five respectively. The members of the order enjoy rank and precedence immediately after the corresponding classes of the Order of the Bath. The insignia of the knights grand cross are a seven-rayed silver star, in the centre of which is a representation of the Archangel St. Michael encountering Satan, and the motto 'Ausplicium melioris sevi' (Augury of a better era); a collar of lions and Maltese crosses, a gold cross badge surmounted by the imperial crown, a Saxon-blue satin mantle lined with scarlet silk, and a blue satin chapeau; of the knights commanders and companions, a four-rayed star and smaller cross.

(6) *The Star of India*, instituted in 1861, now comprises knights grand commanders, knights commanders, and companions. The collar of the star consists of alternate links of lotus flowers and red and white roses and palm branches. The motto is 'Heaven's Light our Guide.'

(7) *The Order of the Indian Empire*, under the grandmastership of the Indian viceroy, was estab. to commemorate Queen Victoria's assumption of the title Empress of India.

(8) *The Royal Victorian Order* was founded by Queen Victoria in 1896 'as a reward for personal services to the queen and her successors.'

(9) *The Most Excellent Order of the British Empire*, instituted in 1917, having both civil and military divs. awarded to both men and women for services rendered to the Brit. Empire. It has five classes: Knights or Dames Grand Cross (G.B.E.); Knights or Dames Commanders (K.B.E. or D.B.E.); Commanders (C.B.E.); Officers (O.B.E.); Members (M.B.E.).

(10) *The Knights Bachelor* do not constitute a royal order, but comprise the surviving representation of the anc. State O. of K. The Register of Knights Bachelor, instituted by James I. in the seventeenth century, lapsed, and in 1905 a voluntary association, now known as 'The Imperial Society of Knights Bachelor' by royal command, was formed with the primary objects of continuing the various registers dating from 1257, and obtaining the uniform registration of every created knight. In 1926 a design for a badge to be worn by Knights Bachelor was approved and adopted.

AUSTRIA: The following orders of Imperial Austria have been officially discontinued, although the orders are still worn. (1) *The Order of the Golden Fleece*,

founded by Philip le Bon (duke of Burgundy and the Netherlands) in 1430, on the occasion of his marriage with Isabella of Portugal. Its archives were taken by Charles VI. to Vienna, and there received with vast splendour, but the possession of the order was for a long time a bone of contention between Spain and Austria, and it must be distinguished from the Sp. order of the same name. The motto is 'Je l'ay empris' (I have accepted it (the order)). The characteristic emblem of the order is the golden fleece, hanging on a golden blue-enamelled flint stone, emitting flames of fire, and the motto 'Pretium laborum non vile.' (2) The purely military *Order of Maria Theresa*, founded by that queen in 1757. (3) *The Order of Leopold* (founded as a set-off to the apostolic *Order of St. Stephen*, which was confined to the nobility), estab. in 1808 by Francis I. for the purpose of honouring all meritorious subjects, civil or military, regardless of rank. (4) *The Order of Elizabeth Theresa*, founded in 1750; the second military order of Austria. (5) *The Order of the Iron Crown*, founded in 1809 by Napoleon Bonaparte in commemoration of his coronation as the first hereditary king of Italy, the reigning kings of the various It. states to be grand masters of the order. After the fall of Napoleon the order was forgotten until Francis I. of Austria, in 1816, during his visits to the new It. provs., reintroduced it in a modified form, when it received the name of the *Austrian Order of the Iron Crown*. The name is derived from the anc. Lombardian crown (which was used to crown Napoleon) of gold and precious stones, behind which is attached an iron ring forged, according to tradition, from the nails of Christ's cross. Other orders of Austria were the *Order of the Star Cross* and the *Teutonic Order* (which originated like the Hospitallers of St. John in the time of the crusades), and the *Civil Cross of Merit*, founded in 1809.

BELGIUM: (1) *Order of Leopold* (civil and military), founded in 1832; motto 'Union is strength.' The administration of the order is vested in the foreign minister. The characteristic emblem is the crossed swords and crowned lion. (2) *Iron Cross and Medal*, founded 1835. Like the Order of Leopold, conferred upon the revolutionary defenders of the fatherland; hence the inscription 'Independance de la Belgique.'

BULGARIA: *The Order of St. Alexander* was instituted in 1881, and the senior *Order of SS. Cyril and Methodius* in 1909, both were abolished by decree in 1918. In the same year the following orders were created or maintained: *People's Republic of Bulgaria*; *People's Liberty 1941-1944*; *9th September 1941: For Bravery* (military); *People's Order of Labour*; *For People's Service*; and *For Science and Arts*.

DENMARK: (1) *The Order of the Elephant*.—Officially dated as of the first half of the fifteenth century, is rarely bestowed and commands high respect. Originally of a religious character, and formerly requiring papal consent on grant, since 1893 it has entirely lost its religious element.

Distinctive emblem, a white elephant and mahout; motto 'Magnanimi Pretium.' (2) *Order of the Dannebrog.*—Second of the Dan. O. of K., founded by Waldemar II., 1319, in honour of the banner of Denmark, which was supposed to have fallen from heaven to inspire the army at the siege of Reval. In 1500 the order was suppressed, but revived by Christian V. in 1671. In 1808 Frederick VI. made it an order of merit for all the Dan. people, whether for military or civil services. It has four degrees, and in addition a class of Dannebrogsmænd, who are not strictly members of the order. In 1842 a special class (grand commanders) was created for persons of royal blood. The decoration is a white enamelled gold cross, suspended by a white ribbon with a red border. The inscription reads 'God and the King,' and it carries the figures 1219, 1671, and 1808.

FRANCE: *The Legion of Honour* (the only existing order in France).—After the coronation of Napoleon (1804), this order, which was estab. in 1802, as early as the year 1814 counted about 37,000 members. Its organisation has been modified at various times, and the order is now divided into five ranks, viz. knights of the grand cross, grand officers, commanders, officers, and knights. There is no more numerous order of knighthood at present in existence anywhere. The highest grades, however, rank with the most exalted European orders, and the celebrated cross is a much coveted distinction. The president of the Fr. Republic is the grand master of the order, but the administration is vested in a grand chancellor. Military and naval members receive salaries when on the active list. Women are eligible, e.g. Rosa Bonheur and Madame Curie were both members. There is a considerable number of foreign members, whilst the number of Fr. members of the four higher classes is limited. The decoration consists of a white enamelled star with double rays under a royal crown, in the centre of which is the effigy of Henry IV., and on the reverse the motto 'Honneur et Patrie.' The star for the knights is silver, and for the other classes gold.

GERMANY: The following are the orders which were in existence under the old Ger. Empire: *The Order of Albert the Bear* (Anhalt); the orders of *Fidelity*, of *Charles Frederick*, of the *Zähringen Lion*, and of *Berthold I.* (Baden); *The Order of St. Hubert* and the military *Order of Maximilian Joseph* (Bavaria); *The Order of Henry the Lion* (Brunswick); the orders of *Louis*, of the *Golden Lion*, and of *Philip the Magnanimous* (Hesse); the orders of the *Wendish Crown*, and of the *Griffin* (Mecklenburg-Schwerin); *The Order of Duke Peter Frederick Louis* (Oldenburg); orders of *The Black Eagle*, of *The Red Eagle*, *Order for Merit*, orders of *The Crown*, of *William*, of *The House of Hohenzollern*, and for ladies, of *Servius* (Prussia); *Order of the Rauten Krone*, or *Crown of Rue*, the military *Order of St. Henry*, and *The Order of Albert* (Saxony); *The Order of Ernest* (duchies of Saxe-Coburg-Gotha and Saxe-Meiningen); *Order of Vigilance* (Saxe-Weimar); orders of *The Crown of*

Württemberg, of *Frederick*, and of *Olga* (Württemberg); *Iron Cross*, originally instituted in 1813 by Frederick William III. for service in the war of Liberation, and granted to civil as well as military personnel. The decoration consists of a Maltese cross of iron edged with silver, and, hitherto, the initial of the sovereign granting the award has been in the centre; above, on the upper arm, is a crown, and below, on the lower arm, the date of the campaign. The Grand Cross of double the size is presented to the victor of a decisive battle. The Cross is worn round the neck. The two remaining classes, called first and second, granted for bravery in action, are worn on the left breast. The order was revived by William I. on July 19, 1870, just before the outbreak of the Franco-Prussian war, and again in the First and Second World Wars, when large numbers were awarded.

The Prussian orders of *The Black Eagle*, and *For Merit*, were among the most distinguished in the world. The former was founded by the elector of Brandenburg on the day of his accession to the throne of Prussia in 1701. The emblem was a blue enamelled octagon, consisting of a cross with 'F.R.' (Fredericus Rex) in the middle of the obverse, and a black eagle with expanded wings in each of the four spaces between the arms of the cross. Candidates must already have been knights of the Red Eagle. *The Order for Merit*, called *Pour le Mérite* in Germany, was divided into two classes: military, and science and art. It was originally founded as the 'Ordre de la Générosité,' by Prince Charles Emil in 1665, but in 1740 converted by Frederick II. to its later appellation and restricted to military persons. A century later it was extended to persons of civil merit, when, among others, the following celebrated Gers. were honoured in the new div.: Savigny, Lessing, Mendelssohn, Schelling, Schlegel, Tieck, Meyrboer, Grimm, Humboldt, and Schwanthaler; and the following foreigners: Count Borghese, Chateaubriand, Faraday, Herschel, Daguerre, F. Liatz, and Rossini. Later recipients include Carlyle and von Moltke.

GREECE: *The Order of the Redeemer*, founded in 1833 by King Otho to commemorate the deliverance of Greece after the war of Independence. Badge: white enamelled cross, the wings of which are connected with oaken and laurel leaves. *The Order of George I.* was instituted in 1912.

HOLLAND: (1) *The Military Order of William*, founded in 1815. Emblem: a cross with the motto 'For valour, devotion, loyalty.' (2) *The Order of Orange Nassau*, founded by Queen Wilhelmina in 1892. (3) *The Order of the Netherlands Lion*, founded (1818) for civil merit.

ITALY: (1) *The Order of the Annunziata*, founded in 1363 by Amadeus VI., count of Savoy, under the style of *The Order of the Collar*. It is the highest order in Italy, and its members take precedence over all other state officials. Emblem: a collar consisting of love-knots and roses, with a pendant and medallion representing the

Annunciation. (2) The order of *SS. Maurizio e Lazzaro* (St. Maurice and St. Lazarus), being a combination of the auct. *Military Order of St. Maurice*, founded in 1434, and the religious *Order of St. Lazarus*, founded in 1572. Its great merit lies in the fact that it is not only pre-eminently conferred on persons notable for their charitable works, but that its income is devoted to charitable purposes. (3) *The Order of the Crown of Italy*, founded in 1868 to commemorate the estab. of the kingdom of Italy. Titles of nobility are no longer recognised, but those existing before Oct. 28, 1922, are incorporated as part of the name.

LUXEMBOURG: *The Order of Adolphus of Nassau* (1858); *The Order of the Oak Crown* (1858, revived); and *The Order of the Golden Lion* (1890), which is the hereditary order of the grand duke.

MONACO: *The Order of St. Charles* (1853, revived).

NORWAY: (1) *The Order of St. Olaf*, founded in honour of the introducer of Christianity into Norway. (2) *The Order of the Norwegian Lion*, founded by Oscar II. in 1904.

POLAND: *The Order of the White Eagle* and *The Order of Polonia Restituta*.

PORTUGAL: The orders of *Christ*, *St. James*, and *Avis*, all three being originally spiritual orders, but secularised in 1789. The first-named was a revival of the Templars after their abolition in France by Philip le Bel, King Louis of Portugal giving an asylum to that famous order in consideration of their support against the Sp. Moors in Algarve. The distinctive emblem is a white cross within a red.

RUMANIA: *The Order of the Star of Rumania* (1877) and *The Order of the Crown of Rumania* (1881). The latter has both civil and military divs. Both were abolished in 1917.

RUSSIA: Under the Soviet Gov. there are no titles. In former imperial Russia the tsar used to be Grand Master of all the Russian orders, with the exception of that of *St. Catherine*, which was an order for ladies. The grand dukes became, at baptism, knights of the order of *St. Andrew*, founded in 1698 by Peter the Great to initiate his court into the refinement of the civilised courts of Europe and to encourage his nobility in the pending war with Turkey; *Alexander Nevsky*, founded in 1725 by Catherine I.; *The White Eagle*, founded in 1713 by Augustus II. of Poland, and after the revolution of 1831 united, together with other Polish orders, with those of Russia; and *St. Anne*, founded in 1735 by Duke Charles Frederick in memory of the Empress Anne and in honour of the Duchess Anna Petrovna. The prin. emblems of the above orders were for that of *St. Andrew*, a blue enamelled figure of St. Andrew on the cross, resting on the eagle of the empire with three crowns; of *Alexander Nevsky*, an octagonal red enamelled cross with the imperial eagle in its corners, and in the middle the figure of St. Alexander on horseback; of *The White Eagle*, a cross containing on its face the white eagle with expanded wings, and gold flames in the

corners; of *St. Anne*, a Maltese cross with the initials of St. Anne and the inscription 'Amant: just: piet: fidem.' The decoration of the order of *St. Catherine* was, for Class I., a grand cross adorned with diamonds, the figure of St. Catherine, was, for Class I., a grand cross adorned with diamonds, the figure of St. Catherine, and the inscription 'For love and fatherland'; for Class II., a similar star smaller in size and with fewer diamonds. *The Military Order of St. George* was founded in 1769 for military service on land or sea, and the decoration was a white cross with gold borders, containing in its central medallion the figure of St. George slaying the dragon. But while there are no titles or O. of K. as such there are many related to war service or labour. The highest Soviet distinctions are those of *Hero of the Soviet Union* and *Hero of Socialist Labour* and both include the *Order of Lenin* (instituted in 1930), the *Hammer and Sickle Gold Medal*, and a certificate of honour. Other orders, instituted between 1918 and 1935, are those of the *Red Banner* (1918), the *Red Banner of Labour* (1920), the *Red Star* (1930), and the *Badge of Honour* (1935). Five more orders, issued during the Second World War, are of the *Patriotic War*, *Suvorov*, *Kutuzov*, *Alexander Nevsky*, *Boydan Khmelnitsky*, and *Victory and Glory*.

SPAIN: All orders were abolished after the declaration of a republic. The chief orders which existed under the monarchy were those of (1) *St. James of Compostella* (patron saint of Spain after the victory of Clavijo), founded by certain nobles in the twelfth century by analogy to the Templars in pursuance of their united intention to protect Christian pilgrims against the Moors. It degenerated into a mere decoration of military merit. The badge is a representation of the cross of red cloth shaped like a sword, with red carved lilies on the hilt, which used to be worn by the old knights. (2) *St. James of Calatrava*, founded with a view to protect Castile against the Moors. The representative cross of this order was a red cross cut out in the form of lilies. (3) *St. James of Alcantara*, formed to protect Spain against the Moorish inroads when the above orders had been compelled to migrate by Ferdinand, king of León and Galicia. The cross in this case, which was substituted for the previous black collar and scapulary, is green. *The Order of the Golden Fleece* has been dealt with under Austrian orders, there having been both a Sp. and an Austrian branch of that order.

SWEDEN: *The Order of the Seraphim*, or the *Blue Ribbon*, founded according to general opinion in 1280 by Magnus I., is the most auct. and illustrious existing Swedish order. Its objects, which were very exalted, consisted in carrying out the candidate's promise made to God and the king to defend the laws of the order, to shed his blood for the evangelical religion and his country, and to sustain the auct. glory of the Swedish name. The badge is a star with the initials J. h. s. (Jesus hominum salvator). Other orders are those of the *Pole Star*, *Charles XIII.*

(granted to freemasons of high degree), *Vasa* or *Green Ribbon*, and the *Sword* or *Yellow Ribbon*.

TURKEY: *The Order of Glory* (1831) and *The Order of Privilege* (1879). Also two other orders with civil and military awards, the *Mejidieh* (1851) and the *Osmanieh* (1862). Titles were abolished in 1934.

YUGOSLAVIA: The following are the old Serbian, and other orders, the traditions of which were continued under the kingdom of Yugoslavia: *The Order of the White Eagle* (1882); *The Order of St. Sava* (1883); *The Order of Atiosch the Great* (1898); *The Order of the Star of Karageorgevich* (1904). *The Order of St. Lazarus* belongs only to the king. They were abolished after the declaration of a republic.

Other and non-European countries also have their O. K. Japan's prin. order is that of the *Chrysanthemum*, founded in 1877, and practically conferred only on members of the royal house or foreign princes. The only Chinese order is that of the Imperial *Double Dragon*, which is conferred only on foreigners, the Chinese native analogy to a knight being the mandarin (q.v.). Siam has *The Order of the White Elephant* (1861), also the *Sacred Order* for royalty; Persia, *The Order of the Sun and Lion* (1808). Egypt has sev. orders of recent creation: *Order of Mohammed Ali* (1915); *Order of the Nile* (1915); *Order of Al Kamal* for ladies (1915); the *Military Star of King Fuzul* (1919); and the *Order of Iemal* (1922). See also **HOSPITALIERS, KNIGHTS OF**.

See G. A. Cibrario, *Descrizione storica degli Ordini Cavallereschi*, 1846; J. B. Burke, *The Book of Orders of Knighthood and Decorations of Honour*, 1858; and the *Almanach de Gotha* (to 1944).

Ordinaries, see **HERALDRY**.

Ordinary, in canon law, designates an ecclesiastic of superior standing, who exercises his jurisdiction according to the normal discipline of the Church. In the Church of England it usually designates the bishop or his chancellor.

Ordinate, see **GEOMETRY, ANALYTICAL**.

Ordination, ceremony at which Holy orders are conferred in the Christian Church. Early forms are to be found in the Prayer-book of Serapion, Justin Martyr, the *Didache*, and the *Canons of Hippolytus*. In the Rom., Gk., and Anglican churches O. can be conferred only by a bishop. Among Presbyterians, O. is performed by the body of presbyters, acting by one of their number previously appointed. Here also the imposition of hands is used. The ceremony by which a bishop is made is called **Consecration**.

Ordnance, heavy weapons of warfare, see **ARTILLERY**.

Ordnance Board. From Coke's reports we learn that the Board of Ordnance took its name from an ordinance or law (not extant) made to regulate the bore and size of artillery, and was the state dept. charged with the care of crown fortresses and their armaments, garrisons, and stores. Apparently the board existed long before the reign of Charles II., but it was not till 1683 that it was reorganised as a civil dept. of the state for the custody and

supply of both naval and ordnance stores, and the master-general of the board placed under the orders of both the Lord Treasurer and the Lord High Admiral. The navy was formerly more associated with the ordnance than the army, but the development of the standing army has resulted in the army subsequently acquiring possession of the Ordnance Dept., and, through the secretary for war, providing all armaments and warlike stores, munitions, and equipments for both services. After the revolution of 1689 the O. B. was divided into two branches: the 'military,' which subsequently became the Ordnance Corps (Royal Artillery and Royal Engineers) under the master-general, and the 'civil,' which had to do with making contracts with manufacturers or contractors to supply warlike munitions and equipments, and acted as custodians of the store dept. The master-general, who was independent of the secretary for war, was president of the O. B. and the chief adviser to the Crown in military matters. This position he held throughout the eighteenth century, and down to 1828 he was generally a member of the Cabinet. The board presented its own estimates to Parliament, and was therefore separately responsible to Parliament for the expenditure of the money voted to it. Use down to its abolition it appears to have done an immense amount of work, though there seems not unnaturally to have been an inveterate antagonism between the Ordnance Dept. and the secretary for war, especially as, in spite of the distinction into a civil and a military branch, the former had soon become more or less merged in the latter. The duties of the board were in the highest degree comprehensive, comprising as they did the construction and upkeep of forts, the acquisition of land for that purpose, the purchasing, warehousing, and forwarding of stores, the manuf. of munitions and equipment for army and navy, and the execution of the ordnance survey (q.v.) and geological survey. It seems clear that all these duties, being essentially ancillary to those of the War Dept., could hardly be economically and efficiently carried out except by that dept., and it is not surprising that they were, in 1855, transferred to the War Dept. by the Ordnance Board Transfer Act, from which year the O. B. ceased to exist. See C. M. Clode, *Military Forces of the Crown*, 1869, and W. R. Anson, *Law of the Constitution*, 1886.

Ordnance Factory, Royal, Brit. Gov. organisation for the production of military and naval war materials. Aircraft factories were controlled during the Second World War by the Ministry of Aircraft Production. There was great expansion of the O. Fs. during the war years, some being both built and worked by the gov. others built by the gov. and worked by private firms under contract. See T. Hay, *R.O.F.: the Story of the Royal Ordnance Factories*, 1940.

Ordnance Survey, body formed in 1791 to make a map of Great Britain at the scale of 1 in. to 1 m., chiefly for defence

purposes. Almost simultaneously Parliament ordered the undertaking of a trigonometrical survey of England and Wales, and, the task being a military one, entrusted it to the Board of Ordnance, whence the title O. S.

By 1840 only Scotland and the six N. Eng. cos. remained unmapped at the 1-in. scale, and in that year the Treasury, after survey experience in Ireland, decided that these areas should be surveyed at the 6 in. to 1 m. scale. A long controversy ensued as to the most suitable scale. A departmental committee in 1853 recommended the survey of all cultivated areas at a scale of 1:2500, a scheme approved by the Treasury, but limited to areas where the 6-in. survey was being carried out. An adverse vote by the House of Commons in 1857 aroused such criticism that a royal commission on the subject was estab., which in 1858 approved the 1:2500 scale. Four years later the House of Commons ordered the extension of a survey at this scale to the S. cos. still mapped only at the 1-in. scale. To meet an agitation for the cheapening of the system of land transfer the estab. of the O. S. was doubled, in 1880, and from 1890 a complete series of the large-scale plans was available.

The civil work of the O. S. had long preponderated over the military, so that in 1870 control passed from the War Office to the Ministry of Works, passing to the Board of Agriculture later and remaining under the control of the equivalent ministry.

The First World War interrupted severely the periodical revision of the large-scale survey, and afterwards financial retrenchment put heavy limitations on the dept.'s work. Thus the inter-war development of new housing estates and roads outstripped the recording of them by the O. S. Administrative efficiency became so impaired that, in 1935, a departmental committee, under Viscount Davidson, was estab. to report on the matter. The Second World War almost immediately interrupted the implementation of the committee's recommendations, and not until 1947 was real progress possible. See also MAPS.

Ordovician, name given by Prof. Lapworth to certain Welsh rocks, the Cambro-Silurian of Murchison and Sedgwick. The system consists of greywackes, grits, and shales, with black mudstones, conglomerates and limestones, and is arranged into three chronological divs.: Arenig, Llandoil, and Bala. The rocks are typically developed in N. Wales, where the Arenig series, which is characterised by huge masses of contemporaneous lavas and ashes, builds up the ranges of Cader Idris and the Arenigs, etc. Dark shales represent the Llandoil in this dist., and the Bala series is made up of flagstones, shales, and thin limestones. Both the Arenig and Bala subdivisions were periods of volcanic activity. Volcanic rocks of Bala age build up the ranges of Snowdon and Penmaenmawr. In Shropshire, the Arenig, Llandoil, and Bala beds are represented by the Shelve series, the Middleton series,

and the Chirbury series and Caradoc beds respectively. The Borrowdale series of the Lake District is underlain by the Skiddaw slates with Arenig graptolites, and overlain by the Conistone limestones with Bala brachiopods. The O. of Scotland (Girvan and Moffat) indicate deep water conditions, and are famous for their radiolarian cherts and the pillow-lavas of Ballantrae. O. rocks are known in Ireland, Scandinavia, Belgium, W. France, Bohemia, N. America, Australia, and New Zealand. The most important fauna of O. time are the graptolites, which are used as zone fossils, Dichograptidae and Phyllograptidae marking the lower half of the system, and Dicranograptidae and Leptograptidae the upper half. The chief genera of Trilobites are *Ogygia* and *Asaphus*. Brachiopods, cephalopods, and radiolaria were abundant, and some fishes have been found in the strata of the Rockies in W. America. The Brit. O. strata are of economic value, being mined for lead and silver, while roofing slates are obtained from the Borrowdale series.

Ordu, vilayet of Turkey on the N. coast of Asia Minor, between Samsun and Kerasund. Pop. 333,900.

Ordzhonikidze, Grigori (1886-1937), Russian statesman, b. at Gorescha. A Georgian, and a Bolshevik Socialist, he estab. the Soviet system in Georgia and Armenia in 1920-21. He was a member of the central executive committee of the Soviet Union, and chief of the main economic council. The tn. of O. (g.v.) was named after him.

Ordzhonikidze (formerly Vladikavkaz), cap. of the N. Ossetian A.S.S.R., on the Terok R. There is a research institute, and metal foundries. To the W. the Sadon mines produce zinc, lead, silver, and copper. O. was founded in 1784 as a fortress. Pop. 127,200.

Ordzhonikidzgrad, tn. of the Bryansk Region of the R.S.F.S.R., 6 m. N.W. of Bryansk. There are railway workshops. Pop. 82,300.

Ore, and Ore Dressing, see METALLURGY (EXTRACTION METALLURGY).

Orebro, or Örebro: 1. Prov. of central Sweden. Area 3560 sq. m. Pop. 240,900. 2. Cap. of above prov., near the W. end of Lake Hjelmarn. 53 m. S.W. of Västerås. It was long a place of assembly of the diet, which, in 1529, here decreed the estab. of Lutheranism. It was largely rebuilt after a fire in 1854, and is now a centre of the iron trade; copper and silver are also mined near by. Manufs. include machinery, chemicals, footwear, and matches, and the chief state railway workshop is here. O. is an inland port and a railway junction. There is a state technical college. Pop. 56,300.

Oregon, the 'Beaver State,' one of the United States of America, founded on the N. by Washington. E. by Idaho (from which states it is separated by the Columbia R. and the Snake R. respectively), S. by California and Nevada, and W. by the Pacific Ocean. Gross area 96,980 sq. m., including 630 sq. m. of water. The prin. rvs. are the Columbia, and its branches, i.e. the Willamette, Fall R., Snake R.,

and the Owyhee. The Columbia, which is 14 m. wide at its mouth, carries abundant steamship traffic 400 m. from the Pacific to the Idaho state lines. The Dalles and Celilo Canal, completed in 1915, opens the Columbia and Snake Rrs. to navigation to a distance of nearly 600 m. from the ocean. Large oceangoing vessels can reach Portland, 103 m. inland. The Cascade Mts., which have extinct volcanic peaks of 4000 to 10,000 ft. high, run N. and S., dividing the state into two unequal regions. The W. third of the state, bordering the Pacific, has a mild, equable, and moist climate, with valleys of great fertility, where pines grow from 250 to 300 ft. high, and firs from 4 to 10 ft. in diameter. Almost every variety of temperate-zone crop is produced. The prin. industries are lumbering, flour and grist milling, fish canning, paper and pulp making, printing and publishing. There are planing mills, meat-packing factories, foundries, copper-smelting works and refineries. Minerals include gold, copper, lead, and mercury. Value of mineral products in 1947 was over \$16,000,000. The timber of O. is the most extensive in the U.S.A. The standing timber equals about 400,000,000 board feet. The ann. cut of timber is the greatest in the U.S.A. The total forest area in 1948 was nearly 30,000,000 ac., of which 17,500,000 ac. were publicly owned, and 11,500,000 ac. were privately owned. The fruit industry is an enormous one. O. apples being sold all over the world. Salmon fisheries, especially at the mouth of the Columbia R., are among the world's finest. Halibut, sturgeon, and oyster fisheries are also abundant.

O. sends to Congress two Senators and four representatives. The Legislative Assembly has a Senate of thirty members, elected for four years, and a House of sixty representatives, elected for two years. The chief religious bodies are Catholic (70,000 members); Methodist (30,000); Disciples of Christ (20,000); and Presbyterian (20,000). School attendance is compulsory from eight to twelve years of age, but if the twelfth year of school has not been completed, attendance is compulsory for a further four years; those between sixteen and eighteen must attend part-time or evening schools if deficient in basic education. Prin. tns.: Portland City (305,400); Salem, the state cap. (30,900); Eugene (20,800); Klamath Falls (16,500); Medford (11,300); and Astoria (10,400). O. was the name formerly given to the whole ter. W. of the Rocky Mts., claimed by the U.S.A. as far as lat. 54° 40' N. This claim was resisted by the Brit. Gov., which asserted a right to the entire ter. The boundary dispute was, however, settled on the forty-ninth parallel. The N. portion is now Washington. The territorial gov. was organised in 1848, and in 1859 it was admitted as a state. Pop. 1,517,000. O. instituted the national movement for direct primaries, initiative, referendum, and recall. It voted for prohibition before the U.S.A. It has a celebrated agric. college at Corvallis with 8000 students. See hist. of the state by N. H. Bancroft, 1886-88;

H. S. Lyman, 1903; C. H. Caroy, 1922; and H. W. Scott, 1924; also J. H. Horner, *Oregon: her History, Great Men, and Literature*, 1921; P. H. Parrish, *Historic Oregon*, 1937; Federal Writers' Project, *Oregon: End of the Trail*, 1940; and P. Parkman, *The Oregon Trail* (Oxford), 1944.

Oregon Pine, see DOUGLAS FIR.

Oregon River, see COLUMBIA RIVER.

O'Reilly, John Boyle (1844-90), Irish revolutionist and author, b. near Drogheda. Convicted of Fenianism in 1866, he was sentenced to death by court martial, but his sentence was commuted. In 1869 he escaped from W. Australia in an Amer. whaler, and settled in Boston, Massachusetts, as a journalist. In 1870 he took part in O'Neill's invasion of Canada. He was well known in America as a writer. His work included four vols. of poems between 1873 and 1886, and *Moondyne*, a novel of convict life (1889). See J. J. Roche, *Life of John Boyle O'Reilly* (includes complete poems and speeches ed. by Mrs. O'R.), 1891.

Orehovo-Zuyevo, tn. of the Moscow region of the R.S.F.S.R., 60 m. E.N.E. of Moscow. There is a large peat electric-power station, and in the dist. are manufs. of cotton fabrics, silk, linen, woollen, and knitted goods. Pop. 99,300.

Orel: 1. Region of the R.S.F.S.R. The surface is hilly. The prov. is drained by the Desna on the W., the Oka on the N., and the Sosna on the E. The soil is fertile and the climate mild. Agriculture and the rearing of pigs and cattle are the chief employments of the people. Corn and hemp are grown. There are also manufs. of chemicals, iron, and leather. Area 18,042 sq. m. Pop. 3,482,000. 2. Or Oryol, cap. of the above region, on the Oka at its confluence with the Orlík, 226 m. S.S.W. of Moscow, and a railway junction. It was founded in 1566, as a stronghold against the inroads of the Tartar tribes of the Crimea. It has a univ., founded in 1919. The chief manufacturing establs. in the tn. are yarn, shoe, rope, and linen thread factories, and metal, glass, and brick works. The prin. articles of export are cereals and hemp. It was nearly destroyed by fire in 1848. O. was of the greatest strategic importance in the Second World War. Pop. 110,500. See further under EASTERN FRONT OR RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR.

Orenburg, see CHKALOV.

Orense: 1. Inland prov. of Spain, bounded S. and W. by Portugal, on the E. by León and N. by Pontevedra. Generally it is mountainous: the prin. riva. are the Miño and Sil. It once formed part of the old prov. of Galicia. Area 2694 sq. m. Pop. 485,900. 2. Cap. of the above, stands on the l. b. of the Miño on Montenegro. The riv. is crossed here by a seven-arched bridge over 1300 ft. long and, at its highest point, 135 ft. above the riv.-bed. It was built by Bishop Lorenzo in the thirteenth century, and repaired two centuries later. O. has a Gothic cathedral, also dating from Lorenzo's time. There are thermal springs in the

vicinity. Hams, chocolate, leather, textiles, and iron goods are produced. Pop. 25,000.

Oreodaphne, see OCOTEA.

Oreodontidae, family of primitive mammals, belongs to the order Ungulata, and all the species are peculiar to N. America, where they occur from the upper Eocene to the lower Pliocene. The dentition is complete, the feet are tetradactyle, the manus either tetra- or pentadactyle. The chief genus is *Oreodon*, of which several species have been found.

Oreodoxa, genus of tropical palms, which are easily grown in the stove-house. *O. oleracea* is the cabbage palm of the W. Indies, its young leaf buds being considered a great delicacy. The leaf-stalks of *O. samraoa* are reddish-bronze when young, and it is often grown for its decorative value. *O. regia*, with long pinnate leaves, is one of the most graceful palms.

Oreopanax, genus of tropical shrubs and trees (family Araliaceae), easily grown in the stove-house if given plenty of water during the summer. *O. andreanum* bears tall erect racemes of green flowers and elliptic leaves. *O. petatum* has roundish heart-shaped leaves, and greenish white flowers.

Oresme, Nicole (Nicolas) (c. 1310-82), Fr. prelate of Normandy, b. near Caen. He became grand master of the college of Navarre (1355), dean of Rouen, and finally bishop of Lisieux (1377), after having been tutor to the dauphin (later Charles V.). He trans. Aristotle's *Ethics*, *Politics*, and other treatises, and wrote the *Tractatus Monitarum* (editor L. Wolsowski, 1864), at the request of Charles V.

Orestes, son of Agamemnon and Clytemnestra. On the murder of his father by his mother and Ægisthus, he was taken by his sister, Electra, to his uncle, Strophius, king of Phocis. He became friendly with Pylades, the king's son, and together they journeyed to Argos, and killed Clytemnestra and Ægisthus. Pursued by the Furies he became mad. According to one story he regained his senses on being tried and acquitted by the court of the Areopagus. According to another story he had to bring the statue of Artemis from the Tauric Chersonesus. Apollo was his adviser in each story.

Oresund, see SUND, THE.

Orfila, Mathieu Joseph Bonaventura (1787-1853), Franco-sp. chemist, b. at Mahon in Minorca. In 1823 O. became prof. of chem. at Paris, and dean of the Faculty of Medicine (1830-48). His celebrated work on poisons, *Toxicologie Générale*, appeared in 1813-14. Other works are *Léçons de médecine légale* (1823) and *Traité des exhumations judiciaires* (1830, with O. Lesueur). See C. Sachaile, *Les Médecins de Paris*, 1843, and P. Ménière, *Nécrologie*, 1853.

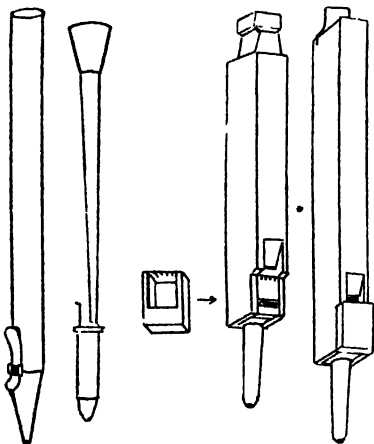
Orford, Earl of, see WALPOLE, HORACE and ROBERT.

Orford, Edward Russell, first Earl of (1653-1727), Eng. admiral, b. at Chiswick. He fought against the Dutch in the North Sea (1672-73), and against the Barbary pirates in the Mediterranean (1676-82). A prominent Whig leader in the revolution

of 1688, he signed the paper inviting William of Orange to England. He defeated the Fr. off La Hogue or Barleur (1692), became first lord of the Admiralty (1691-99) and again 1709-10 and 1714-17, and was created earl of Orford and Viscount Barleur (1697). The title died with him, but was renewed for the Walpole family (1742). See J. Campbell, *Lives of the Admirals*, ii., 1779, and J. Charnock, *Biographia Navalis*, 1794-98.

Organ. The O. is probably the most ancient musical instrument, in some shape or form. It was derived, like smaller instruments of the flute family, from the pan-pipe. Although this form of stopped pipe was the first known, it is certain that open and reed pipes, too, were known at an early date. The earliest type of O. was presumably of Chaldean origin; the pipes were ranged on top of a wind-box, air being admitted to each pipe by drawing out a slotted lever, so that the slot, corresponding with the foot of the pipe, allowed a current of air to pass into the pipe, and so produce sound. The wind pressure was at first derived either from blowing with the mouth, or from the *hydraulus*, a hydraulic apparatus which gave a more balanced and regular supply of air. Later, crude bellows were introduced, but not until the fourteenth century was the *hydraulus* finally discarded. This method of producing sound was, with slight modifications, employed until the eleventh century. Meanwhile, by the end of the fourth century, the O. was well established as a church instrument, and in the seventh century its introduction was encouraged by Pope Vitalian. In A.-S. England, and in France, O. playing and also O. making were well known by the eighth century; and in the next century Germany also became the home of those arts. Up to this time, Arabia, Constantinople, and Venice had been leaders, but they were now superseded by France and Germany, and during the tenth century England was enriched by many notable specimens (e.g., the celebrated and very large Winchester instrument). For long after the tenth century there were few O.'s that could not easily be moved about the church; the term *positive* O.s. was used for those of fixed position, while those that were carried in procession by a player who played the keys with one hand and with the other manipulated the bellows were portable O.s. The introduction in the eleventh century of a crude lever-key system, to replace the old draw-slides, was a very important development. The sixteen-note instrument at Magdeburg Cathedral being the first recorded keyboard O. The keys, however, at this time, were of considerable size, and had to be punched down. In the twelfth century, pipes sounding thirds, fifths, and eights were added, but so far no method of playing save with the full O. had been invented. The first instance of an attempt in that direction was made in the Halberstadt O. (fourteenth century), which had three separate keyboards, two of which sounded only part of

the full group of pipes for a particular note. By this means, a descant was made possible and the introduction of the notes F \sharp , C \sharp , E \flat , and G \sharp made further advances possible. In the fifteenth century keys more convenient in size, and a system of pedals, were invented; and the first step in the direction of 'registration' was made by the introduction of the spring-box, by which various sets of pipes, singly or in optional groups, could be manipulated through the medium of one manual. So far, only open metal pipes, resulting in one quality of tone, had been used. Tone-colour was next obtained by the addition of stopped wood pipes for soft tones, *e.g.* flute, bourdon, etc.; and



ORGAN PIPES

Left to right: Open diapason (metal) pipe—pure organ tone; oboe (metal)—imitative reed tone; 'stopped' wood pipe—flute tone; 'open' wood pipe—flute tone.

reed stops, such as the posaune and trumpet, were also added. String-tones, too, were obtained by the use of cylindrical pipes of small bore; and experiments were carried out in the use of tapering pipes. Although not introduced into England until nearly 300 years later, the Ger. O. builders of this period used a separate set of pipes for the pedal, thus originating the 'pedal bass.' More modern inventions may be said to begin with the composition pedal (1809). In 1832 Barker invented a pneumatic lever, which overcame the excessive exertion that had formerly been entailed in playing with a full or heavy registration. Two years later Elliot and Hill introduced the radiating pedal-board into the York Minster O.; this idea was later combined with Willis's concave and radiating pedal-board.

The ordinary modern O. embodies these principles. It consists of bellows, wind-trunk, and chests and keys and pedals; the keys and pedals are in contact by

means of a system of trackers or of electric cables with the pipes and reeds, which are grouped at discretion by means of stops, composition-pedals, and couplers. The electric-contact ideas were first brought forward by Dr. Gauntlett at the 1851 Crystal Palace Exhibition. At the Paris Exhibition in 1867 the tubular pneumatic system was advanced. All modern touch-systems are variants of those two methods. The keys are arranged in three, four, or five rows, or manuals, the order of the manuals being (1) 'great,' (2) 'swell,' (3) 'choir,' (4) 'solo,' and (5) 'echo.' In a three-manual O. the 'solo' is occasionally found instead of the 'choir.' The principle of the swell was invented by Jordan in 1712; the pipes are ranged in a box, of which the front resembles a Venetian blind, which opens or closes as the swell-pedal is manipulated. The Hope-Jones electro-pneumatic Os. have a double touch, *i.e.* two levels of depression for the same key, the lower being more emphatic and suitable for picking out a theme, the higher being adapted to accompaniment. Similar effects are obtainable by means of ingenious inventions by Casson and others. The compass of keys on a modern O. is five octaves (sixty-one notes), and of pedals, thirty-two notes; and many improvements and new ideas in the matter of swell- and composition-pedals and combination couplers continue to be presented. With the advance in the mechanical perfection of the instrument has come a corresponding advance in case of control which has made possible the construction of gigantic instruments of which the most notable example is that in the Convention Hall, Atlantic City, U.S.A. This instrument possesses seven manuals, 1249 stop keys, and over 33,000 pipes, whilst its blowing apparatus necessitates engines of over 400 h.p. Its tonal range is remarkable and is spread over four gallery Os. in addition to its main divs. While nothing approaching the size of this monster is found in this country there are many magnificent examples of the O.-builder's art in cathedrals, churches, and concert halls. Notable examples are those at Liverpool Cathedral, St. Paul's, and Canterbury Cathedral. Size alone is not a criterion, many notable Os. with a smaller tonal range depending chiefly on the refinement and balance of their tone colours rather than on great power.

Although now passing into disuse, the cinema O. contributed something new both in tonal values and constructional technique. Making free use of the extension principle whereby various tones are 'borrowed' at varying pitches, its main tone is based on the tibia, a large-scale flute, instead of the diapason. String, brass, and wood-wind stops give an orchestral effect and ingenious mechanical devices make possible a variety of percussion effects. A tremulant is generally used over the whole tonal range to overcome the dead acoustics of the average cinema. Instruments vary in size from small instruments with only five main ranks to large concert Os. of three or four

manuals capable of reproducing the full range of orchestral tone colour.

In 1935 a new type of instrument made its appearance—the electronic O. Instead of pipes, this new development made use of the thermionic valve. The depression of a key caused a valve to oscillate at a fixed frequency corresponding to the note. The electrical wave so produced was fed into an amplifying unit similar to that of a radio set and thence into loudspeakers whence it emerged as sound. Various modulations of tone colour were brought about by the addition of the necessary harmonics to the fundamental tone. Since that date there have been many developments both in the system whereby the initial tone is produced and in tonal variety. The chief advantage of the electronic O. is that it does not require tuning, having no pipes; it takes up a minimum space and is considerably cheaper than the pipe O. Nevertheless it is still only in the development stage. A full understanding of its working requires a certain technical knowledge in electrical science, but the subject is fully covered in *The Electronic Musical Instrument Manual* by Alan Douglas.

The case of the *electronic* in instrument has brought about a great advance in playing technique. It would be invidious to mention by name any of the recitalists of to-day, especially since many of them are so well known through the medium of broadcast recitals.

The standard of professional competence in O. playing is safeguarded by the Royal College of Organists. This body holds examinations every year not only in playing but in general musicianship, and its diplomas of A.R.C.O. and F.R.C.O. indicate a high level of musical education.

Burns' *Dictionary of Organs and Organists* (1921) list over 700 books in the bibliography of the instrument, many of which are now only to be found in technical reference libraries. The standard work on the subject is E. J. Hopkins, *The Organ: its History and Construction*, 1877, now out of print but available in many libraries. For a list of some seventy other books the reader is referred to L. Scholes's *List of Books about Music*, 1939, a copy of which should be available in any public library. Many articles of interest have appeared in the monthly journals, the *Musical Times* and *Musical Opinion*, and the quarterly journal, *The Organ* is devoted to full descriptions of outstanding instruments with illustrations.

Organ, Organic, Organism, see under BIOLOGY.

Organic Chemistry. term formerly applied to the study of compounds obtained directly or indirectly from living organisms or their products or remains, but now used to denote the chem. of the compounds of carbon. The name was first definitely employed in the modern sense by Gmelin in 1818. Organic compounds are extraordinarily numerous, and include such important and diverse substances as hydrocyanic acid, strychnine, brucine, and oxalic acid among poisons; aspirin, antifebrin, salvarsan, chloral,

Bayer 205, morphia, penicillin, mepacrin, and diamantine among drugs; chloroform, ether, cocaine and novocaine among anesthetics; lyddite, trinitrotoluene (T.N.T.), dynamite, nitroglycerine, cordite, and gun-cotton among explosives; camphor, vanillin, musk, geraniol, citral, ionone, and benzaldehyde among perfumes; coal, petrol, paraffin, coal-gas, and most other fuels; starch, sugar, fats, vegetable and animal oils, proteins, and vitamins among foodstuffs; phenol, cresol, iodoform, and formalin among antiseptics; and cotton, silver, alcohol, vinegar, turpentine, soap, dyes, paper, calcium carbide, and photographic developers among common commodities. Protoplasm itself, the actual living matter of animals and plants is a congeries of carbon compounds.

Historical.—Although many organic compounds, such as starch and sugar, have been known from very early times, little progress was made in the elucidation of their properties and composition until the late eighteenth century, when the Swedish Pomeranian chemist, C. W. Scheele (1712-86) first prepared, and examined the properties of, chemically pure specimens of many important carbon compounds, e.g. glycerine, uric acid, milk-sugar, and hydrocyanic acid. A. L. Lavoisier (1743-91) began the systematic analysis of organic compounds and showed that, in addition to carbon, the elements most frequently present in them are hydrogen and oxygen, and, less often nitrogen, chlorine, sulphur, phosphorus, and other elements. Further advances in methods of analysis were made by J. von Liebig (1803-73), and with the simultaneous progress in general chemical theory it became at length possible to arrive at definite conclusions as to the structure of numerous carbon compounds.

In the early days of the science it was believed that organic compounds could be originally formed only under the influence of an occult *vitalis* or vital force, but this belief was gradually abandoned when such typical products of living organisms as alcohol, urea, and oxalic acid were prepared artificially in the laboratory. A striking discovery, made by Liebig in 1823, that the molecules of silver cyanate and silver fulminate consist of the same numbers of the same atoms, followed by the further discovery (F. Wohler, 1828) of the same peculiar relationship between urea and ammonium cyanate, led to the recognition of the phenomenon of isomerism (*q.v.*) To define the constitution of an organic compound it is, in fact, insufficient to state merely the numbers of the atoms of the various elements in its molecule, since many different compounds of the same molecular formula (isomers) may exist. Thus the formula C_2H_6O applies to two compounds, viz. alcohol and dimethyl ether, while the formula $C_{12}H_{22}O_{11}$ applies to at least 120 different compounds. The frequency with which isomerism occurs emphasised the need to investigate the constitution of carbon compounds much more closely, with the aim of discovering the way in which the

atoms are arranged within the molecule. The results of such investigation are expressed in structural formulae, whereby the difference between isomers is clearly indicated. Thus dimethyl ether exhibits properties best indicated by the formula CH_3OCH_3 , whereas the properties of alcohol are represented by the formula $\text{CH}_3\text{CH}_2\text{OH}$. Both formulae it will be observed, contain the same number of the same atoms, viz. two of carbon, six of hydrogen and one of oxygen, but the structure of one molecule is entirely different from that of the other.

Prominent in this research into the molecular architecture of organic compounds were Liebig and Wohler who

alone. Further progress was made by J. B. A. Dumas (1800-81), who showed that many properties of organic compounds were conditioned by the general structure of the molecule as a whole, and that as long as this structure was broadly maintained an electropositive element such as hydrogen might be partly or wholly replaced by such a typically electronegative element as chlorine without alteration of the fundamental nature of the compound so treated. While at first this theory of types appeared to be diametrically opposed to the radical theory, A. Laurent (1807-83) and C. F. Gerhardt (1816-96) showed that the two might easily be reconciled since substitution of



A GENERAL VIEW OF A MODERN ORGANIC RESEARCH LABORATORY

showed that certain groups of atoms, radicals, could maintain their identity throughout a series of chemical changes and were present in numerous related compounds. Thus the radical benzoyl $\text{C}_6\text{H}_5\text{CO}$ whilst incapable of independent existence is contained in the following (and in many other) substances: benzoic acid $\text{C}_6\text{H}_5\text{COOH}$, benzoyl chloride $\text{C}_6\text{H}_5\text{COCl}$, benzoyl iodide $\text{C}_6\text{H}_5\text{COI}$, benzyl cyanide $\text{C}_6\text{H}_5\text{CH}_2\text{CN}$, benzamide $\text{C}_6\text{H}_5\text{CONH}_2$, and benzaldehyde, $\text{C}_6\text{H}_5\text{CHO}$. While the number of radicals is theoretically infinite it is found in practice that only a comparatively small number occurs with any marked frequency, and by a study of the properties that these common radicals (e.g. methyl CH_3 -, ethyl C_2H_5 -, carbonyl $-\text{COOH}$, carbonyl $>\text{CO}$, aldehyde $-\text{CHO}$, phenyl C_6H_5 -) confer on compounds containing them, it is possible to deduce their presence or absence in newly discovered compounds and to predict with some confidence the properties of a compound from its structural formula.

chlorine for hydrogen and other similar replacements might well leave the general shape and position of the radicals unchanged, the derived radicals being roughly similar in chemical character to the originals.

In 1828 Sir Edward Frankland (1818-1898) introduced the idea of valency (1911) or definite combining power of atoms, observing for example that one atom of phosphorus showed a tendency to combine with either three or five atoms of other elements, but no other number, the valency of phosphorus was therefore said to be three or five. Hydrogen on the other hand has only one combining bond per atom while oxygen has two, so that to satisfy the combining power of one oxygen atom two hydrogen atoms are needed. The theory of valency, as applied to organic compounds was greatly improved and extended by F. A. Kekulé (1829-96) who in 1858 showed that carbon uniformly has a valency of four and that carbon atoms have the remark-

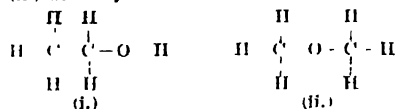
able and almost unique power of linking up together to form chains, rings, etc., which constitute the framework of the compound molecules. Thus butane, $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$, has a straight chain of four carbon atoms: $\text{C}-\text{C}-\text{C}-\text{C}$; isobutane, $(\text{CH}_3)_2\text{CH}-\text{CH}_3$, a branched chain:

$\begin{array}{c} \text{C} \\ | \\ \text{C}-\text{C}-\text{C} \end{array}$; and benzene, C_6H_6 , a closed

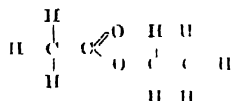
chain or ring of six carbon atoms:

$\begin{array}{c} \text{C} & & \text{C} \\ / & & \backslash \\ \text{C} & & \text{C} \end{array}$ In 1865 Crum Brown (d.

1922) introduced the system of denoting each valency bond, or unit of combining power, by a line, a neat device that at once rendered possible the clear and precise formulation of the supposed arrangement of atoms within a molecule. For example, the graphic formulae of (d.) alcohol, and (ii.) dimethyl ether are written as follows:



Similarly, the more complicated molecule of ethyl acetate is graphically represented as:



While such formulae undoubtedly indicate to some extent the actual spatial arrangements of the atoms in a molecule, they are more rightly to be regarded as an epitome of the chemical properties of the substances they represent, and their value is consequently in no wise diminished by modern theories and discoveries relating to the structure of the atom.

Remarkable evidence on this point is to be found in the facts of stereoisomerism (*q.v.*), a branch of O. C. founded by L. Pasteur (1822-95), J. H. van't Hoff (1852-1911), and J. A. Le Bel (1847-1930). They

showed that the ordinary plane formulae were insufficient to account for certain cases of isomerism, *e.g.* that of the lactic acids, where three distinct compounds exist, all of which must be represented by the single plane formula, $\text{CH}_3\text{CH}(\text{OH})\text{CO}_2\text{H}$, and van't Hoff and Le Bel independently and almost simultaneously in 1874 suggested that in such cases it is necessary to take into account the three-dimensional structure of the molecules. It has indeed been found that wherever the molecules of a compound are asymmetric, the observed isomerism can be explained only by space formulae, and, conversely, it has been possible to predict previously undiscovered isomers by a recognition of asymmetry in the molecules of a substance. Such isomerism (stereoisomerism) is not always accompanied by asymmetry, but when asymmetry is present the stereoisomers

are distinguished by their optical effects on polarised light.

The rapid growth of O. C. in the last hundred years has been extraordinarily fruitful on the practical side, since the structure of many valuable natural products has been ascertained, and their manuf. by artificial methods from cheap sources rendered possible. Thus indigo, acetic acid, alizarin, and methyl alcohol, to name only a few, can now be prepared synthetically at a much lower cost than formerly; while the range of dyes, drugs, explosives, etc., has been extended enormously by applications of the knowledge won by organic chemists. In the sphere of biochemistry (*q.v.*) O. C. is throwing light on the physiological basis of life whilst in medicine it is now possible deliberately to build up new remedial and preventive substances of practically any desired character. In agriculture, horticulture, paper-making, brewing, tanning, and numerous other industries the organic chemist is playing an ever-increasing part while the former art of perfumery is rapidly becoming a more specialised branch of the science of O. C.

General.—Organic compounds are classed in sev. divs., of which the two principal are the fatty or aliphatic (*q.v.*) and the aromatic (*q.v.*). Aliphatic compounds, so called on account of the fact that the fats are among the most typical members of this div. (*Gk. αληφης, fat*), may theoretically be regarded as ultimately derived from methane or marsh gas, CH_4 , while benzene and its derivatives are classed as aromatic. The main distinction in structure between the two groups is that the aromatic substances contain a closed chain nucleus of carbon

atoms, *e.g.* benzene, $\text{HC} \begin{array}{c} \text{H} \\ \diagup \quad \diagdown \\ \text{C} & \text{C} \\ \diagdown \quad \diagup \\ \text{H} & \text{H} \end{array} \text{H}$, and

naphthalene, $\text{HC} \begin{array}{c} \text{H} & \text{H} \\ \diagup & \diagdown \\ \text{C} & \text{C} \\ \diagdown & \diagup \\ \text{H} & \text{H} \end{array} \text{H}$ while

the aliphatic compounds have open chains of carbon atoms, *e.g.* pentane $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$. Heterocyclic compounds contain a closed ring consisting partly of carbon atoms and partly of other multivalent atoms, *e.g.* pyridine

$\begin{array}{c} \text{H} & \text{H} \\ | & | \\ \text{N} & \text{C} \\ / & \backslash \\ \text{C} & \text{C} \\ | & | \\ \text{H} & \text{H} \end{array}$ CH. Within each large div.

the compounds fall into well-defined homologous series. Any particular homologous series can be represented by an algebraic formula, *e.g.* $\text{C}_n\text{H}_{2n+2}$ for the paraffin series, and any two consecutive members of a series differ in molecular constitution by one carbon atom and two hydrogen atoms. Thus methane, CH_4 , ethane, C_2H_6 , and propane, C_3H_8 , are the first three members of the paraffins. All

the members of a given series can be prepared by similar methods and show a general similarity of properties, two facts that do much to lighten the labour of the student of O. C. Some of the prin. classes of organic compounds are given below, with general formulae:

Aliphatic.

1. Paraffins, C_nH_{2n+2} .
2. Olefines, C_nH_{2n} .
3. Acetylenes, C_nH_{2n-2} .
4. Alcohols, e.g. $C_nH_{2n+1}OH$.
5. Aldehydes, e.g. $C_nH_{2n+1}CHO$.
6. Fatty Acids, $C_nH_{2n+1}CO_2H$.
7. Ketones, e.g. $C_nH_{2n+1}CO-C_nH_{2m+1}$.
8. Ethers, $C_nH_{2n+1}OC_mH_{2m+1}$.
9. Amines, e.g. $C_nH_{2n+1}NH_2$.
10. Amides, e.g. $C_nH_{2n+1}CONH_2$.
11. Carbohydrates, e.g. $C_6H_{12}O_6$, glucose, $C_{12}H_{22}O_{11}$, cane-sugar, and $(C_6H_{10}O_5)_n$, starch.

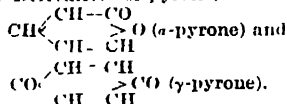
Aromatic.

1. Benzene hydrocarbons, C_6H_6 .
2. Nitro-compounds, e.g. $C_6H_5NO_2$.
3. Amino-compounds, e.g. $C_6H_5NH_2$.
4. Phenols, e.g. C_6H_5OH .
5. Sulphonic acids, e.g. $C_6H_5SO_3H$.
6. Diazo-compounds, e.g. $C_6H_5N_2Cl$ and aromatic alcohols, aldehydes, acids, ketones, ethers, amides, amines, etc.).

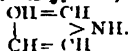
Heterocyclic.

1. Derivatives of pyridine, C_5H_5N .

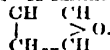
2. Derivatives of pyrone.



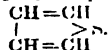
3. Derivatives of pyrrole,



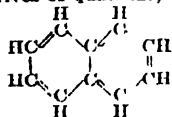
4. Derivatives of furane,



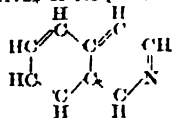
5. Derivatives of thiophen,



6. Derivatives of quinoline,



7. Derivatives of isoquinoline,



See J. B. Cohen, *Organic Chemistry for Advanced Students*, 1907, 1928; F. Bollstein, *Handbuch der organischen Verbindungen*, 1918-28; A. F. Hollemann, *Textbook of Organic Chemistry*, 1920; E. J. Holmyard, *Outlines of Organic Chemistry*, 1924, 1936; H. Gilman, *Organic Chemistry*, 1938; and P. Karrer, *Lehrbuch der organischen Chemie*, 1913.

Organic Husbandry, practice of agriculture and horticulture in all their phases based upon the use of organic materials and natural methods, to the exclusion of chemical fertilisers, dusts, and sprays, and artificial forcing of stock for their produce. The keynote is the law of return, whereby it is held that the residues of organic life, plant remains, animal and human excreta, etc., must be returned to the earth, and in decomposition stimulate the natural processes that restore and build soil fertility. A naturally fertile soil means healthy plants; healthy plant food means healthy animals and humans. The cycle is thereby complete, and high disease-resistance means no need for insecticides, fungicides, or medicine. O. H. also embraces mixed, not specialised, farming, mixed crops rather than monoculture, and the use of soil-building plants and trees to prevent erosion. Theoretically it is held that chemical fertilisers disrupt the natural processes of nutrition, destroy an essential link between certain soil-fungi (mycorrhiza) and plants, and so adversely affect plant and animal nutrition and health. In practice, O. H. is founded on the conservation of all plant and organic debris on farms and gardens, and their conversion into humus and plant foods via the compost heap. Composting methods vary in detail, but in principle consist of the stacking of mixed organic materials in layers, sandwich-fashion. The thickest layers are of plant debris topped by thinner layers of animal matter (manure, etc.) which serve to accelerate decomposition. A dusting of lime may be added as an alkalinising base, and a sprinkling of soil. The sequence is repeated to form moist, aerated, flat-topped heaps with tapering sides, not less than 5 ft. square and 4 ft. high. Heaps may be turned one or more times to restimulate rotting. Compost heaps can be made smaller than the dimensions stated above if given protection in a compost bin. In scarcity of animal manure, organic fertilisers (bone meal, hoof, and horn, dried blood, etc.) may be used. Finished compost is applied at any season. High handling and labour costs are the chief disadvantages. Shrot composting is practised on farms and consists of dressing green manure crops of spent pastures with farmyard manure and ploughing in by Aug.-Sept. Consistent stocking of the soil with organic matter improves it biologically and chemically, and the accretion of humus and plant nutrients gives sound fertility. See Sir A. Howard, *An Agricultural Testament*, 1940; F. H. Billington, *Compost*, 1942; Lady Eve Balfour, *The Living Soil*, 1913, 1917; Friend Sykes, *Humus and the Farmer*, 1946; and E. Pfeiffer, *Soil Fertility, Renewal, and Preservation*, 1947.

Organisation for European Economic Co-operation, formed after the Foreign Aid Act authorising the Marshall Plan for European Recovery was signed by President Truman on April 3, 1948; the sixteen European nations which had accepted the Marshall offer met in Paris to set up a joint organisation (i.e. the O.E.E.C.) which was intended to outlive the European Recovery Programme. The understanding was that European countries should come to an agreement upon the economic assistance required from the U.S.A., and upon measures of self-help. A preliminary conference between Britain, France, and Russia, in 1947, broke down when the Soviet Union expressed its dislike of a European economic programme on the grounds that current arrangements would be disturbed and national sovereignty impaired. The other two countries, however, issued invitations to all European states save Spain, to take part in measures of economic co-operation. Fourteen accepted the invitation, namely Austria, Belgium, Denmark, Elro, Greece, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Sweden, Switzerland, and Turkey. Czechoslovakia's initial acceptance was later reversed, and other countries in the Russian sphere of influence refused, namely, Bulgaria, Finland, Hungary, Poland, Rumania, and Yugoslavia. A conference of the sixteen participants was held in Paris, and ultimately outlined a plan for the restoration of European economy by the end of 1951. This was held to require four measures: the solving of the problem of Europe's trade deficit with America, estimated at \$22,440,000,000 for 1948-51; maximum mutual co-operation by the sixteen nations; the establishment of internal financial stability; and maximum production by each participant. A convention in 1948 was signed by the sixteen countries, the Anglo-Amer. and Fr. occupation zones of Germany, and the Anglo-Amer. zone of the Trieste free ter. The first part thereof laid down the general obligations undertaken in the field of economic co-operation; the second set out the constitution of the permanent O.E.E.C., namely, a council, an executive committee of seven, a secretariat, and sev. *ad hoc* committees. In the U.S.A. the Economic Co-operation Act of 1948 became law in April, authorising the expenditure of \$5,300,000,000 for the European recovery programme over the succeeding twelve months. Congress ultimately appropriated \$5,055,000,000 for this purpose. An Economic Co-operation Administration was estab. (E.C.A.) under an administrator, represented by a special representative in Europe, and missions in each participating country. Assistance was to be contingent upon intra-European co-operation, and also each participant was required to conclude an agreement with the U.S.A. for the supply of information, stabilisation of currency, promotion of production, etc. Specific projects substantially undertaken with assistance under the Act were to be approved by the

administrator. O.E.E.C. shared out to the participants the Amer. aid, which was voted in a block allocation, in proportion to their own contributions to self-help under the intra-European payments scheme. It also undertook to study individual programmes, and reported thereon to the Amer. authorities in Dec. 1948. Hoffman, the Marshall Aid administrator, urged the economic integration of W. union—the creation of a permanent, freely trading area comprising 270,000,000 consumers. He called on the O.E.E.C. (Oct. 31, 1949) to have ready early in 1950 a record of accomplishment and a programme which would take Europe well along the road towards this goal. He also advocated direct incentives to private exporters to help close the dollar gap—gov. targets and exhortations being insufficient. See also *Europe, History—Marshall Plan* and subsequent sections. See F. Perroux, *Le Plan Marshall, ou l'Europe nécessaire au monde*, 1948, and the O.E.E.C. reports as pub. by H.M.S.O.

Organists, Royal College of, see **ROYAL**.
Organo-Metallic Compounds. Compounds of metals with alkyl (e.g. C_2H_5) or aryl (e.g. C_6H_5) groups. They are colourless liquids with low boiling points. Many of them are decomposed by water with liberation of much heat, and burn in air often with explosive violence. Some compounds, e.g. $Mg < Br$, contain halogen as well. These are known as Grignard's reagents. Thus to make magnesium ethyl bromide, dry magnesium (1 atom) is covered in a flask with dry ether and 1 molecule of ethyl bromide is added. A vigorous action sets in, and finally a solution of the Grignard reagent in ether is obtained. These reagents are very valuable in organic chemistry. Thus with water and alcohol they yield hydrocarbons; with oxygen they give alcohols; they react with halides of metals (and some non-metals); they absorb carbon dioxide and can be made to yield acids (carboxylic) by treating the product with a dilute mineral acid. Aldehydes can be converted into secondary alcohols, and so on.

O.-M. C. of the type $Mg(C_2H_5)_2$ can be made either by the action of an alkyl halide with the metal, or by the action of zinc alkyl and the metallic chloride in question. Thus $Su(C_2H_5)_2$ can be made from stannic chloride and zinc ethyl. $Zn(C_2H_5)_2$. Zinc ethyl itself is a liquid which boils at $118^\circ C$. Aluminium methyl, $Al(CH_3)_3$, boils at $130^\circ C$. and reacts violently with water. Mercury, tin, lead, etc., yield compounds like $Hg(C_2H_5)_2$, whilst lead tetraethyl (q.v.) has found commercial application as an anti-knock reagent. Mercuric ethyl is obtained from zinc ethyl and mercuric chloride, and also by the action of ethyl iodide on sodium amalgam. It boils at $159^\circ C$, i.e. very poisonous, but does not oxidise easily in air.

Organon, see **PHILOSOPHY, Logic**.
Orgeiev, or **Orgiev**, tn. of the Moldavian S.S.R., on the Runt R., 25 m. N. of Kishinev. There are limestone quarries, and

various manufs., including tanning and dyeing. Pop. 18,000.

Orgies (Gk. ὄργια), name in anct. Greece for ceremonies, especially applied to secret religious rites and customs connected with the worship of various pagan divinities (Dionysus or Bacchus, Demeter or Cybele, Orpheus), to which only the initiated were admitted. The modern sense of debauchery and unbridled revelry is derived from the acts of mystic symbolism and unrestrained licence which were characteristic of such feasts as the Dionysia and Eleusinian mysteries (*q.v.*).

Oriani, Alfredo (1852-1907), It. novelist and essayist, scarcely known outside Italy, is celebrated in his own land as the precursor of Fascism, and the Fascists undertook a national ed. of his works. He was born at Casola Valcenio, a small vil. in Romagna, and here in his villa he passed most of his life. During his life he was practically ignored by the mass, but was later honoured not only by the Fascists, but also by the critic Benedetto Croce, and by the literary group of the journal *Voce*. He preached that Italy needed real unity, and that there was too much regionalism. Italy must affirm its place in Africa, alongside the other great European colonising powers. To the tendency prevailing in his time he opposed the martial spirit. These things were especially set forth in *The Political Battle in Italy* (1892) and *The Ideal Revolt* (1907). Also for a time he tried his hand at novels, which were marked by a pitiless realism, the fruit of his observation of the villagers around him. Among these were *Jealousy* (1894); *Defect* (1890); and *Holocaust* (1902).

Oribasius (c. A.D. 326-403), Gk. physician, native of Sardis or Pergamum, friend and physician of the Emperor Julian, accompanying him to Gaul (355) and to Persia (363). He became quæstor of Constantinople (361). O. was banished temporarily by Valentinian and Valens, but recalled in 370. Half of his *Medicinalia Collecta* (Συναγόμενα Τρίβια) is extant. It is largely compiled from Galen and others (see ed. of 1852-76).

Orid, see ORIDA.

Oriel College, Oxford, founded in 1326 by Edward II., prompted thereto by Adam de Brome, clerk in chancery. The name comes from a message in Oxford called *La Oriele*, which was denied to the college at its foundation, but the origin of this name is unknown. The number of fellows was at first ten, with a provost, but additional endowments brought the number up to eighteen. Famous members of the college include Sir Walter Raleigh, Gilbert White, Thomas Hughes, and Cecil Rhodes. See D. W. Rannie, *Oriel College*, 1900; G. C. Richards and H. E. Salter, *The Dean's Register of Oriel, 1116-1661*, 1926; and G. L. Shadwell and H. E. Salter, *Oriel College Records*, 1926.

Oriel Window, projecting window differentiated from a bay window by the fact that it is not on the ground floor. Among old writers, however, the term is frequently applied to an ordinary bay

window. The oriel projects from an upper storey, and is supported by some ornamental feature such as a bracket, corbel, or engaged column. Oriel windows were commonly used in late Gothic civil architecture, more especially in France and England.

Oriental and African Studies, School of was formally opened by King George V. on Feb. 23, 1917, its original charter of incorporation being issued on June 5, 1916. In the amending charter of 1938 (which added the words 'and African' to the title and restated the purposes of the school) it is provided that the purposes are 'to further research in, and to extend the study and knowledge of the languages of Eastern and African peoples, ancient and modern, and the literature, history, religion, law, customs, and art of those peoples. The school is affiliated to the univ. of London. The courses are designed for the needs of persons about to proceed to the East or to Africa for study and research, for the public service or commerce, or for the pursuit of a profession or calling.' The governing body comprises, besides *ex officio* members—representatives of the foreign secretary, the secretaries of state for war and the colonies, the corporation of the city of London, the L.C.C., Brit. Academy, London Chamber of Commerce, and Council of the Royal Asiatic Society. The scope of the teaching covers culture and hist., phonetics, linguistics, courses for colonial service probationers, and commercial courses. Instruction in culture and hist. embraces the hist. of oriental and African countries, with Intermediate and B.A. honours courses in the hist. of the near and middle E., of India, and of the Far E.; Arabic epigraphy; Heb. epigraphy and palaeography; Persian epigraphy; Indian palaeography; Burmese and Mon epigraphy; oriental laws and their hist., in particular, Islamic law throughout the world, Hindu law; Burmese Buddhist law; Chinese law; the literatures, religions, philosophies, and customs of oriental and African countries; oriental art and archaeology, and social anthropology. See *Bulletin of the School of Oriental Studies, London Institution*, vol. i., 1917-20, and *The Calendar of the School of Oriental and African Studies for Thirty-Third Session, 1945-49*.

Oriental Languages, see under LINGUISTIC FAMILIES, *The Tibeto-Chinese Linguistic Family*.

Oriental Plague, see under PLAGUE.

Orientalion, determination of the points of the compass with special regard to the E.; in eccles. architecture the arrangement of a sacred building so that its main axis may point towards the E. In the Gk. temples the main door was at the E. end, and some such custom was followed in the early Church. The altar was near the W. end, and the officiant faced the people standing still further W. Later the custom became estab. of placing the altar at or near the E. end, the priest officiating usually with his back to the congregation.

Oriente: 1. The most easterly of the Cuban provs. (formerly Santiaço de Cuba),

covering an area of 14,128 sq. in. The prov. is mountainous in parts, but is drained by numerous streams and has some fertile valleys and plains. The highest mt. peak is Turquino (8320 ft.). The chief products are iron, copper, manganese, mercury, slate, marble, sugar, tobacco, fruit, cereals, coffee, honey, wax, petroleum, etc. Cap. Santiago. Pop. 1,356,500. 2. Region of Ecuador, S. America, on the E. side of the Andes. It is divided (since 1925) into the provs. of Napo-Pastaza and Santiago-Zamora. It comprises a large tract of country in the Amazon valley, and is crossed by many rivers. An area rich in timber, rubber, and probably gold, its possession has been disputed by Ecuador, Peru, and Colombia. Area 219,095 sq. m., of which only 110,000 are inhabited. Pop. 295,200.

Orient Line, line of steamships between London and Australia, which succeeded the old O. L. of sailing ships which used to ply between London and Adelaide. Its steamship service to Australia was started in 1878. At that time it sailed some of the Pacific Steam Navigation Company's ships, but this arrangement ended in 1901 and, later, the O. L. built a new fleet of 12,000-ton steamers to replace them. The Orient steamers call at Gibraltar, Marseilles, Toulon, Port Said, Suez, Colombo, etc., on their way to Australia. The O. L. is a subsidiary of the P. & O. Line. The *Orcades* (31,000 tons gross), largest passenger liner yet built in the Vickers-Armstrong Barrow yard, was launched in Oct. 1917. She was named after a new ship lost during the Second World War, and can accommodate 750 passengers in first class, and the same number in the tourist class, and carries a crew of 608, with a speed of 22½ knots; she can make the passage between England and Melbourne in twenty-eight days. A second ship for the Orient company, with similar characteristics, was laid down on the berth vacated by the *Orcades*.

Oriflamme (Med. Lat. *auriflamma*), red flag of the abbey of St. Denis, which the kings of France received from the abbot on their consecration. It was at first used only against infidels, but later was in general use, appearing for the last time at Agincourt. In the fifteenth century the O. was superseded by the blue standard powdered with fleurs-de-lis, and the last mention of the original O. is in the inventory of the abbey of St. Denis dated 1531.

Origanum, genus of aromatic herbs and sub-shrubs (family Labiatae). *O. Marjorana* is the sweet marjoram of gardeners. *O. vulgare*, the common marjoram with purple or white flowers, is also aromatic. *O. dictamnus*, dittany of Crete, is a handsome pink-flowered plant often grown in hanging baskets.

Origen (186-c. 254), given by Eusebius the title of Adamantius, was b. at Alexandria of Christian parents, and later became the most famous and influential Christian writer of his century. Under the persecution of Septimius Severus (202) his father, Leonidas, achieved martyrdom, and herein he would gladly have been

followed by his son, had Origen not been prevented by his mother. The boy was brought up at the feet of Pantenus and Clement of Alexandria, and so great was his progress that Demetrius, bishop of Alexandria, and later one of his most determined opponents, permitted him to give catechetical instruction at the age of eighteen. Not only was O. learned in the scriptures, but was also thoroughly conversant with Gk. philosophy. The persecution of Caracalla (216) was specially directed against the learned, and therefore O. was forced to leave his native city. He travelled through Palestine, and here he gave public instructions in the Scriptures at the invitation of the bishops of Jerusalem and Caesarea. Demetrius objected to this as being out of order, for O. was not a presbyter, and he returned to Alexandria. About 231 he paid another visit to Palestine on his way to Greece, and on this journey the two bishops ordained him presbyter. Demetrius again objected on technical grounds, and a synod deposed O. and forbade him to teach in Alexandria. Palestine and certain other dioceses refused to accept this decision and O. settled at Caesarea. His fame soon raised the school to a position almost equal to that of Alexandria.

O. was a most voluminous writer. His influence was vast, though even in his own day he was suspected of heresy. His great work was the adaptation of Gk. philosophy (especially the Logos doctrine) to the needs of Christian thought. An outstanding biblical scholar, O. represented all that was best in the scholarship and exegesis of the first three centuries of the Christian era and, like Erasmus, he stood for breadth in Christian thought and tolerance in controversy. If in some essentials Erasmus and O. are alike, they differed in that Erasmus was more a man of the world, and O. more ascetic and more devout. In theology Erasmus learnt from O. and, broadly speaking, O. liberated Erasmus from subservience to Augustine and Aristotle. O. drew men's attention from Aristotle to Plato, from St. Paul to St. John, from the atonement to the incarnation. O. and Augustine are among the most famous theologians of the Catholic Church, and they supplement and correct one another, for each is weak where the other is strong. Among his works, extant in some form or other, are *Hexapla* (q.v.), commentaries on Matthew, John, and Romans, his work on *Fundamental Doctrines* (*Hex. symm.*), and his great apologetic *Against the Gentes*. The best ed. of his works is that of the Berlin Academy (commenced 1899). See also G. Thomasius, *Origenes*, 1837; J. Denis, *La Philosophie d'Origene*, 1884; J. von Harack, *History of Dogma*, vol. II, 1894-99; W. Fairweather, *Origene and Greek Patristic Theology*, 1901; E. de Faye, *Origene*, 1928; and A. Leske, *Theologie der Logik-mystik bei Origenes*, 1935.

Original Sin, doctrine of the corruption of human nature inherited from Adam's fall, and the consequent necessity of baptism for remission of sins and of divine grace for recovering God's good pleasure.

The doctrine, though developed by St. Augustine in the fifth century, was not formulated by him. The foundation in the O.T. is the story of Adam and Eve in Genesis; the *locus classicus* in the N.T. is St. Paul, Rom. v. 12-21. Early witnesses to it among the fathers are Irenæus (*Adv. Hæc.* iii. 22, v. 14), Tertullian (*De Test. Animæ* iii.) and Origen (*Hom. in Jer.* viii. 1). In the fourth century it was denied by Pelagius, and hence underwent a considerable development by St. Augustine, especially in his *De gratia Christi et de peccato originali* (418) and his works against Pelagius. He showed that the practice of baptising infants implicitly assumed that they were in a 'state of O. S.' The doctrine was reaffirmed by the Council of Trent (1545-1563) in its fifth session. Calvin taught that through Adam's fall depravity and corruption attached to all men in such a way that the redemption covered without eradicating their guilt. For testimonies from the fathers see R. de Jouanel, *Euchiridion Patristicum*, 1928.

Orihuela, city of Spain in the prov. of Alicante, on both sides of the Segura, 13 m. N.E. of Murcia. Called Orellis by the Goths, it is an ant. bishopric. There is a trade in fruit, wine, oil, cereals, and manufactures of linen, silk, and woollen goods. etc. Pop. 38,000.

Orillia, summer resort of Ontario, Canada on Lake Couchiching in Simcoe co., 60 m. N. of Toronto. There are iron foundries and saw- and grist-mills, and factories for making motor cars and agric. implements. Pop. 8100.

Orinoco, third largest riv. of S. America, being next in importance to the Amazon and Plata. Its source is in the Sierra Parima, Venezuela, at an altitude of nearly 5000 ft., below Ferdinand de Lesseps Peak, 3° 40' N. lat. and 61° 30' W. long. Up to its junction with the Guaviare, which joins it on the l. b., W. of 68° W. long., it holds a generally E.N.E. course for 360 m. After flowing W.S.W. 20 m. past Esmeraldas, it is joined on the l. b., at 3° 10' N. lat. and 66° 17' W. long., by the Casiquiare, which links up at its S. extremity with the Rio Negro, a trib. of the Amazon, while, on the r. b., it is joined by the Ventuari. From its confluence with the Guaviare it flows almost due N. for 350 m., being joined on the l. b. by the Vichada and Meta, both in Colombia, and the Apure and its many trib. in Venezuela, and descending from the highlands by the cataracts of Maitures (which are nearly 2 m. wide and some 660 yds. long) and Atures (5 m. wide and 6 m. long). Between the mouths of the Guaviare and Meta it separates Venezuela from Colombia, but otherwise its entire course runs through Venezuelan ter. From the junction with the Apure the main stream flows almost due E., across the llanos or grassy plains to the Atlantic at 8° 20' to 10° 0' N. lat. In this part of its course the prin. tribs. are the Caura, Caroni, and Paragua, all in Venezuela, and all flowing from the S. The delta begins at 62° 30' W. long., 130 m. from its mouth by throwing off a branch which flows N. into

the Atlantic, and covers an area of 8500 sq. m. The Boca de Navios, between Brit. Guiana and Nulma Isle, is the mouth mostly used, but six others are also navigable. The Boca de Navios is divided by a line of ls. into two channels, each 2 m. in width. The water of the riv. is of a milky-white colour, and may be easily distinguished at a great distance from the land. The O., from its source in S.E. Venezuela on the Brazilian border, thus describes a great semicircle, the estuary being no more than 500 m. from its source in the Sierra Parima, whilst its entire course is 1960 m., of which 900 m. below the Atures cataracts and 600 m. above them at the Maitures cataracts are navigable. The head of uninterrupted navigation is at the confluence of the O. with the Apure, 777 m. from the mouth of the riv. During its upper course the O. flows between the mts. and dense forests of Venezuelan Guiana on the E., and the wide llanos of Colombia on the W.; but after it reaches the lowlands, below its junction with the Apure, it has mts. on its l. b. or N. side and the plains on its r. b. At a distance of 150 m. from its source the riv. is only 90 yds. wide; above its junction with the Casiquiare, at an altitude of 1000 ft., it is 650 yds. wide; below its junction with the Apure, at an altitude of 200 ft., it is from 4 to 5 m. wide. In the flood season (April-Sept.), following the rains, the lower course becomes an immense lake, covering the llanos for some miles to the E. of the Apure. The area of the basin is about 370,000 sq. m.

Orioles are passeriform birds found only in the old world, and constitute the family Oriolidae; the Amer. O., or Baltimore birds (*g.r.*) belong to a separate family, the Icteridae. The birds are insectivorous and frugivorous, and hence are to be seen usually on forest trees. The plumage is generally very brilliant, and the male bird utters a flute-like note. *Oriolus galbula* (*orolus*), the golden oriole, which is occasionally seen in Britain, is orange-yellow in colour with black markings; *O. kundoo* is the Indian mango-bird.

Orion, in Gk. mythology, was the son of Hyrieus, of Boeotia, a hunter of great beauty. He loved Merope, the daughter of Cepion of Chios, and for offering violence to her was blinded by Dionysus. He opened his eyes to the rising sun, and his sight was restored. He afterwards lived in Crete, and hunted in company with Artemis, and, according to one version of the legend, he was slain by the bite of a scorpion.

Orion, most brilliant and interesting of the constellations, contains three splendid stars, Rigel (magnitude 0.3), Betelgeuse (0.9), Bellatrix (1.9), and forty-four stars between magnitudes 4 to 5.2. The Great Nebula in O., which is just visible to the naked eye, is one of sev. nebulae in the constellation, but none of the others approaches it in size. It surrounds θ Orionis, the middle star of the giant's sword (see NEBULÆ). Betelgeuse is one of the largest stars visible, its diameter being about 270,000,000 m. It is a cool star, the surface temp. being only 2500° C. The

stars in O are not all at the same distance from the earth, Rigel being about three times as far away as Betelgeuse and the others are situated at various distances.

Orion's Dog, see CANIS MAJOR

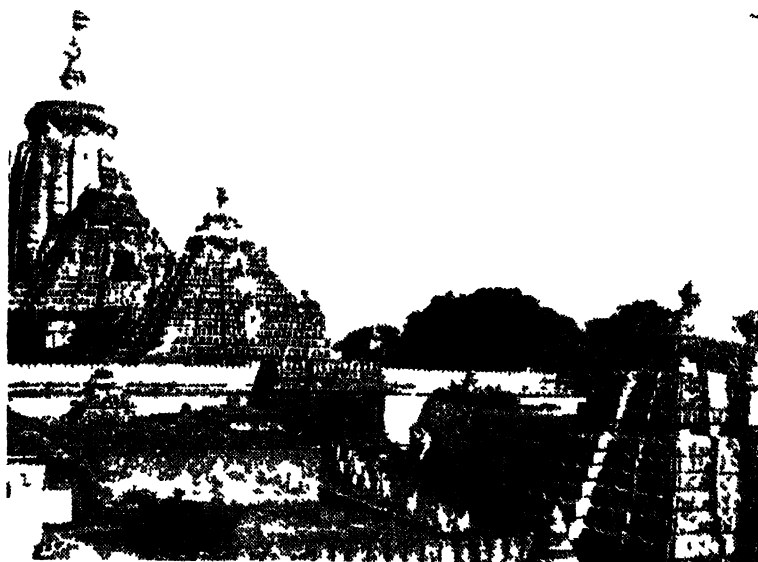
Orissa, prov. of India, recently separated from Bihar, but enlarged by some dists. which were transferred from Madras and the Central Provs. The cultivation of rice is the main activity of over two-thirds of the people. Some jute is produced, and sugar cane and cereals are grown for domestic consumption. Turmeric is grown in the Ganjam dist. for export. Cuttack (cap.) (pop. 63,000) is

the old O. div. It now comprises the six dists. of Balasore, Cuttack, Ganjam, Koraput, Puri and Sambalpur. It is administered by a governor, assisted by a council of ministers and a single chamber legislature. Area 59,835 sq. m. Pop. 12,143,000. See C. B. M. under *Orissa in the Morning* 1925.

Oristano, city of Sardinia, Italy, on the Gulf of O. on the W. coast. There are potteries. Pop. 16,800.

Oriza Language, see under INDO-EUROPEAN LANGUAGES.

Orizaba, city of Mexico, in the state of Vera Cruz, 28 m. N. E. of Mexico city.



ORISSA, INDIA. THE JAGANNATH TEMPLE

known for fluffee work. Puri (39,000) is famous for the temple and procession of Jagannath. O. is under the jurisdiction of the high court of Calcutta. The prov. has six colleges, the Ravenshaw College at Cuttack is maintained by the gov. and affiliated to the Patna Univ. There are also over 120 special schools for boys and girls, including training schools. There are 500 m. of railway in the prov. and 1,000 m. of roads. O. is ceded to the Marathas in 1751, was conquered by the Brit. in 1803. The various dists. formed in outlying portion of the Bengal Presidency up to 1912, when they were transferred to Bihar, but in 1936 it was constituted a separate prov. some portions of the Central Provs. and Madras (which latter provs. had long contained what, in effect, were parts of O. considered in its cultural unity) being transferred to

It is reached from the cap. via the B. by the Mexican S. branch of the National Railway. There is a good rubber trade in sugar and tobacco. Textiles are made, and there are railway workshops. The weaving of table linens is a new and thriving industry, and there is also noted for its wool-zine. There are many silver and gold mines in the neighborhood. Cattle raising and agriculture are also carried on. The chief crop is coffee. The Mitla (mt.) runs are 25 m. S.W. of the town. In the vicinity of the slumbering volcano of O. or Citlaltépetl, which rises to a height of 18,300 ft. Its last serious eruption was in 1566. Pop. 29,300.

Orizonte (Jan Frans van Bloemen) (1662 c. 1740) Dutch painter, b. at Antwerp. He left his native town for Italy early in life, and passed the remainder of

his life in that country. His finest pictures are in the pontifical palace at Monte Cavallo. He was particularly noted for his landscape paintings, and was nicknamed 'Orizonte' by the Society of Flemings at Rome by reason of the beauty and delicacy shown in his portrayal of distances. He had two brothers, also painters, viz. *Pieter van Bloemen*, called 'Standaert' (1657-1719), and *Norbert van Bloemen*, called 'Cephalus' (1670-1746).

Orjonikidze, see **ORDZHONIKIDZE**.

Orjonikidzgrad, see **ORDZHONIKIDZEGRAD**.

Orkhon Inscriptions (also known as **Siberian, Early Turki, Pre-Islamic Turki** or **Kök Turki Runes**) are the earliest epigraphical monuments written in Turki; and the earliest alphabetic inscriptions discovered in N. central Asia. They belong to the seventh and eighth centuries A.D. Some of them are long funerary inscriptions, describing the war-glories of the T'u-küe or Türküt (plural of Turk; Turks), the earliest known Turki people, who ruled over Mongolia from the mid sixth century A.D. to the mid eighth century. These inscriptions were found on the Upper Ob, the Upper Yenisei, and particularly on the R. Orkhon, to the S. of Lake Balkul. The inscriptions are written either in horizontal lines running, like the Semitic alphabets, from right to left, or vertically (perhaps under Chinese influence) in columns following each other from right to left. This script was deciphered in 1893 by the Dan. scholar W. Thomsen. The language of the inscriptions is early Turki, the oldest form known of the Turkish tongue, which differs very widely from Osmanli Turkish. The script, which must have already been in use in the sixth century A.D., consists of thirty-eight letters, of which four are vowels (*a, y, u, ö* or *ü*); curiously enough, many consonants vary in form according to the following vowel-sound, e.g. *k* has as many as five forms (for writing (1) *ka*, (2) *ky*, (3) *ko* or *ku*, (4) *ka*, *ke*, *ki*, and (5) *kö* or *kü*). The origin of this script is uncertain; it may have derived from a local Pahlavik script (see under **PAHLAVI**) or from the Sogdian alphabet (see under **ALPHABET**).

There are two forms of the Orkhon script, the monumental, of which a few varieties are known, and which externally resembles the Teutonic runes, and the cursive form, the script of various fragments at Turfan (E. or Chinese Turkistan).

Orkney Islands, separated from Caithness by the Pentland Firth (q.v.), lie between 58° 41' 24" and 59° 23' 2" N. lat. and between 2° 22' 2" and 3° 25' 10" W. long.; and are seventy-three in number at low water, of which twenty-eight, besides Pomona, or Mainland, are inhabited. The area of the O. I. is 376 sq. m. The surface is very irregular, and the land is indented by numerous arms of the sea. Next to Pomona, the most important of the is. are N. and S. Ronaldshay, Hoy, Rousay, Stronsay, Flotta, Shapinsay, Eday, and Sanday. The highest peak

is Ward Hill in Hoy, which has an elevation of 1560 ft. The temp. of the O. I. is comparatively mild, considering their N. lat. This is due chiefly to the proximity of the Gulf Stream. There is little difference in temp. between day and night; and frost and snow are rare. The rainfall averages 36½ in. At the season of the 'longest day' there is no darkness for about six weeks and during the summer solstice snapshots can be taken at midnight. The exports are chiefly fish, agricultural produce, and cattle. The chief tns. are Kirkwall, the cap., and Stromness. The Orkney and Shetland (q.v.) Is. return one member to Parliament.

Many brochs, chambered cairns, and burial mounds remain as evidence of prehistoric and Norse settlements. The Neolithic dwellings of Skara Brae are important examples. The Orkneys, under the name Orcaades, are mentioned by the anc. geographers, Pliny, Ptolemy, and others. In 876 Harald Haarfager conquered both them and the Hebrides. During the greater part of the tenth century they were ruled by independent Scandinavian jarls (earls), but in 1098 they became formally subject to the Norwegian crown. Thus they remained Scandinavian till 1468, when they were given to James III. of Scotland as a security for the dowry of his wife, Margaret of Denmark. The is. were never redeemed from this pledge; and in 1590, on the marriage of James VI. with the Dan. Princess Anne, Denmark formally resigned all pretensions to the sovereignty of the Orkneys. During their long connection, however, with Norway and Denmark, all traces of the primitive Celtic pop. disappeared, and the present inhab. are of the pure Scandinavian stock. Pop. 21,900. See J. Gunn (ed.), *The Orkney Book*, 1909; A. W. Brogger, *Ancient Emigrants, Norse Settlements*, 1929; V. G. Childe, *Skara Brae*, 1931; and J. S. Clouston, *A History of the Orkneys*, 1932.

Orkney and Shetland, Duke of, see **BOTHWELL, EARL OF**.

Orlando, Vittorio Emanuele (b. 1860), It. jurist and statesman, b. in Sicily, was a prof. of constitutional law at Palermo. He became minister of the Interior in Boselli's Cabinet (1916). He succeeded Boselli as premier in 1917, and proved a tower of strength at the time of Gen. Cadorna's (q.v.) disastrous defeat at Caporetto (q.v.) by stiffening the national resistance. In the Inter-Allied Peace Conference in Paris, 1919, he was one of the 'Big Four' (see **PEACE CONFERENCE**). He succeeded from the council in May 1919 on the Fiume question. Retiring from politics after the advent of Fascism, with which he had no sympathy, he returned to the Constituent Assembly to fight against the peace treaty after the Second World War, but, on the Chamber's approval of the treaty, he resigned his seat.

Orlando, tn. in Florida, U.S.A., co. seat of Orange co., 125 m. S. of Jacksonville. Citrus fruits are cultivated here, and it is a favourite centre for tourists. Pop. 36,700.

Orléanais, former prov. of France, Pagus Aurelianensis of the Romans. It

corresponds to the present depts. of Loiret, Loir-et-Cher, Eure-et-Loir, and parts of Seine-et-Oise, Nièvre, etc. Orleans was the cap.

Orleans, Dukes of. The title, of duke of O. was created by Philip VI., and conferred on his son Philip. When the third duke ascended the throne of France as Louis XII. in 1498, the duchy lapsed. Louis XIII. in 1626 bestowed the title of duke of O. on Jean Baptiste Gaston; but the title was not revived after his death until, in 1660, Louis XIV. revived it in favour of his brother Philip. Descendants of this line are living at the present time; a brief account of the persons who have held the title follows:

Louis (1372-1407), the younger son of Charles V., was previously count of Valois and of Beaumont-sur-Oise and duke of Touraine, being created duke of O. in 1392. He married Valentina, daughter of the duke of Milan. His quarrel with Philip II., duke of Burgundy, on the question of his wife's claims to Milan culminated after the death of Philip in his being murdered by one of the partisans of John, Philip's successor.

Charles (1391-1465), commonly called Charles d'Orléans, was the eldest son of the above duke. He married Isabella, the widow of Richard II. of England, in 1406; in 1415 he was captured at Agincourt, and kept a prisoner in England until Nov. 1440. Released then, he spent most of the rest of his life at Blois, where he held a literary court. He is a graceful poet, representing the art of the last period of the Middle Ages, and some of his romances are surpassed by none in their class.

Jean Baptiste Gaston (1608-60), was the third son of Henri IV. and Marie de Medici. He married, first Marie de Bourbon, and secondly, Marguerite, a sister of the duke of Lorraine. His nature was weak and his part in the intrigues of the period did him but little credit. He died at Blois.

Philippe I (1640-1701), the son of Louis XIII. of France, was created duke of Orleans in 1661, and married Henrietta, sister of Charles II. of England, the same year. After her death (supposed to have been by poison at the duke's instigation) he married Charlotte Elizabeth, daughter of Charles Louis, elector-palatine of the Rhine.

Philippe II. (1671-1723), regent of France, the son of the above duke, bore the title of duke of Chartres until the death of his father. On the death of Louis XIV., he became sole regent in spite of the king's testament, which he induced Parliament to set aside. On the king attaining his majority in 1723 Philip continued in power as his prime minister. It was during his regency that the schemes of John Law (*q.v.*), the Scottish financier, which Philip countenanced, brought the country to the verge of bankruptcy. The talents of the duke were great, but were counterbalanced by his debauchery and vice.

Louis (1703-52), the only son of the above duke, who succeeded to the duke-

dom in 1723, was pious, cultured, and peaceable; after holding the post of colonel-general of infantry for eight years he retired into private life in 1730. He married Augusta, the daughter of Louis William, margrave of Baden.

Louis Philippe Joseph (Egalité) (1747-1793), b. at St. Cloud, was principally notable for his complete change of views during the revolution, when he took the name of Philippe Egalité, and voted for the death of Louis XVI., but he was guillotined in spite of his views. He married the daughter of the duke of Penthièvre.

Ferdinand Philip Louis Charles Henri (1810-42), was b. at Palermo. He served with distinction in sev. campaigns, and organised the battalion of light infantry known as the Chasseurs d'Orléans.

Henri (Prince of Orleans) (1867-1901), was b. at Ham, near Richmond. He was chiefly noted as a traveler and explorer, discovering the source of the Irrawaddy, for which he received the medal of the Geographical Society of Paris.

Louis Philippe Robert (1869-1926), was b. at Twickenham and educated in France till 1886; he returned thither in 1890 and expressed a wish to serve as a conscript, but was imprisoned for a short period. He served with the Brit. Army in India, and in 1900 caused adverse comment by his countenance of insolent caricatures of Queen Victoria. On his death, without issue, Jean, duke of Guise, became pretender to the Fr. kingship, being succeeded in 1940 by his son Henri, comte de Paris. See M. Coryn, *House of Orleans*, 1936.

Orleans, important commercial tn. of France, cap. of the dept. of Loiret, and formerly cap. of the old prov. of Orléanais, is situated on the r. b. of the Loire, 754 m. S.S.W. of Paris by railway. O. stands on the verge of a magnificent plain sloping toward the Loire, and watered by the Loire and Loiret. Among its prin. buildings are the cathedral, with two lofty and elegant towers, one of the finest Gothic edifices in the country; the tower; bishop's residence; the houses of Joan of Arc, of Agnes Sorel, of Diane de Poitiers, of Francis I., and of Richelieu. The tn. contains three statues of Joan of Arc. Manufs. include hosiery, cotton, and linen goods, blankets, refined sugar, vinegar, leather, tobacco, machinery, etc. There is some trade in wine, brandy, corn, and sugar. In 1128 O. was besieged by the Eng. under the duke of Bedford, but was delivered by the inspiring exertions of Joan of Arc (*q.v.*), who on this account is also named the Maid of Orleans. Pop. 71,606.

Orleans, Isle of, is. of Quebec, just below Quebec City, on the R. St. Lawrence. It is a fertile spot, 21 m. long, with an area of 69 sq. m., and is noted as a summer resort. It possesses, beside mackerel, cod, and halibut fisheries, large deposits of gypsum.

Orleans, Maid of, *see* JOAN OF ARC.

Orleans, New, *see* NEW ORLEANS.

Orley, Bernart van (c. 1190-c. 1542), Flem. painter, b. at Brussels. He studied under Raphael at Rome, and later was appointed painter to Margaret of Austria. He made a number of designs for tapestry.

the most celebrated being 'The Life of Abraham' at Hampton Court, and 'Maximilian's Hunts' in the Louvre, and among his numerous pictures are 'The Last Judgment,' 'The Holy Family,' 'The Magdalen Reading' (in the National Gallery, London), 'The Descent from the Cross,' 'Christ on the Cross,' etc.

Orloff Diamond, see DIAMOND.

Orlov, or **Orloff**, noted Russian family: *Alexis, Count O.* (c. 1736-1808), Russian admiral, was an accomplice in the conspiracy of 1762, which made Catherine autocrat of Russia in place of Peter III., whom O. killed. Made an admiral, he commanded a naval expedition against the Turks, whom he defeated at Chesme.

Theodore (Fedor) O. (1741-96), Russian officer, brother of above, fought against the Turks and took Navarino in 1770.

Gregory O. (1734-83), Russian courtier and general, brother of two preceding, saw service in the Seven Years war.

Gregory O., Count (1777-1826), nephew of Alexis. He lived principally in Paris and Italy, and pub. *Travels in Paris of France*, etc.

Michael O. (1785-1841), son of Theodore, served in campaigns against Bonaparte. He took part in secret associations of the Russian Army in the reign of Alexander, and was disgraced in 1825.

Orm, or **Ormin**, see under ORMULUM.

Ormazd (or **Ahura Mazda**), in the Zoroastrian system, was the principle of light and good and creator of all things. He is in perpetual conflict with Ahriman (p.e.), but will prevail ultimately. The Lat. form is Ormazdes.

Orme, Robert (1728-1801), historian of India, b. at Anjengo on the Malabar coast, went to Calcutta in 1742, and entered the E. India Company's service. In 1752 he pub. *A General Idea of the Government and People of Indostan*. He was appointed a member of the council at Madras two years later. Returning to England in 1760, he began his *History of the Military Transactions of the British Nation in Indostan from the year 1745* (1763-78). He also wrote other books and essays on India.

Ormesby, par. and vil. of N. Riding, Yorkshire, England, 4 m. S.E. of Middlesbrough.

Orme's Head, Great, bold promontory in the extreme N. of Carnarvonshire, N. Wales. It projects into the Irish Sea, 5 m. N.W. by N. of Conway, and has a light-house visible at a distance of 24 m. The Little O. H., a smaller headland, lies to the E.

Ormoe, pueblo of Leyte, Philippine Is., on the W. coast, 34 m. W. of Tacloban. Hemp is largely produced. Pop. 40,000.

Ormolu (Fr. or *moulu*, ground gold), species of brass, made up of equal parts of copper, zinc, and tin, and of a golden-yellow colour. The prin. use of O. is for the mountings of furniture. Small articles are made from O., and it is also a basis for cloisonné work, produced in China for a long period.

Ormond, health resort of Florida, U.S.A., in Volusia co., on the Halifax, 68

m. S. of St. Augustine. Between it and Daytona, to the S., stretches the Daytona Beach, used for automobile racing and speed trials. Pop. 1600.

Ormonde, James Butler, first Duke of (1610-88), succeeded as twelfth earl of O. in 1633, and in 1661 was created duke in the Irish, and in 1682 duke in the Eng., peerage. He acted for Charles I. against the Irish rebels in 1643, and in the following year was appointed lord-lieutenant of Ireland. In 1648 he was royalist commander in Ireland, where, after the execution of the king, he proclaimed Charles II. He was defeated by Cromwell in 1649, and fled abroad to join the king. On the restoration he was made lord steward of the household, and was again lord-lieutenant of Ireland in 1661-69, and 1677-82, and once more in 1681. After James II. came to the throne he retired into private life, but in 1687-88 he opposed sev. of the more arbitrary acts of the king, and especially those directed against Protestantism.

Ormonde, James Butler, second Duke of (1665-1745), eldest surviving son of Thomas, earl of Ossory, succeeded to the dukedom in 1688. He was a supporter of William and Mary and at their coronation acted as lord high constable. He commanded the Life Guards at the battle of the Boyne, and was present at the battle of Steinkerk. He was taken prisoner at the battle of Landen, but was exchanged for the duke of Berwick. Under Anne he held the offices of lord-lieutenant of Ireland and captain-general of the forces. From the latter office he was removed on the accession of George I., and in 1715, as a leader of the Eng. Jacobites, was impeached, but escaped to France. He now threw in his lot with the pretender, and took part in the rising of 1715, and four years later accepted the command of the abortive expedition of the Sp. fleet to England.

Ormonde, old name for the dist., comprising Tipperary, Ireland, which afterwards became E. Munster.

Ormskirk, anc. mkt. tn. of Lancashire, England, 11 m. N.E. of Liverpool. There is a seventeenth-century grammar school, and a church with both a spire and a tower. There are brass foundries, an ordnance depot, breweries, and cake and biscuit factories. It is celebrated for gingerbread. Pop. 20,700.

Ormulum, early Eng. metrical trans. of the gospel hist., consisting of a series of Eng. homilies in iambic verse written by Orm, canon of St. Augustine in the vicinity of Lincoln, about 1200. See also under ENGLISH LANGUAGE. See ed. of R. M. White, 1852 (revised by R. Holt, 1878), and P. Lambertz, *Die Sprache des Ormulum nach der lautlichen Seite untersucht*, 1901.

Ormuz, see HORMUS.

Ornaments, term for accessories of a church or the worship in it, e.g. vestments, organ, bells, plate, paten, chalice, font, pulpit, pastoral staff, etc. The question as to what is allowed according to the ornaments rubric in the Book of Common Prayer has involved considerable con-

trovercy and litigation, but, broadly, most of the *O.* used in 1549 are regarded as legal.

Ornaments, Musical, notes which are not a part of the melody or harmony, but merely embellishments thereof. Some are now obsolete, either because the fashion of highly ornamented playing and singing is dead or because great elaboration is not suited to modern instruments. Some of the embellishments that were indispensable to the harpsichord, for example, because of its inability to give prominence to certain notes by accentuation, sound merely fussy on the pianoforte. *O.* include acciaccatura, mordent, shake, turn, roulade, etc.

Oro: 1. Dept. of N.W. France, formed from part of anc. Normandy, and divided into the arrons. of Alençon, Argentan, and Mortagne; cap. Alençon. It comprises two distinct physical regions, viz. the W., consisting of rugged hills and extensive forests, with patches of pastureland occasionally interspersed, and the E. with fertile valleys and rich pasture lands. Iron, copper, lead, and granite are the prin. minerals. Cereals are cultivated to a certain extent, but more care and attention are given to the apple and pear orchards, for the raising of cider and perry. The dept. is famous for its horses, and cattle are reared and dairy produce exported. Iron wares, linens, cotton, lace, glass, and leather goods are the prin. manufs. The dept. was the scene of heavy fighting in 1944. Area 2371 sq. m. Pop. 273,200. 2. Riv. of France rising in the *O.* dept., and flowing generally N.W. for half its course, and N.E. for the remainder, reaches the Eng. Channel in the bay of the Seine. Length 80 m. The prin. tns. on its banks are Caen, near the mouth, Thury, Harcourt, and Argentan, all of which places were involved in the battle of Normandy of 1914. See further under WESTERN FRONT IN SECOND WORLD WAR.

Ornithocephalus, small genus of epiphytal orchids, natives of tropical America. *O. grandiflorus* bears racemes of white and green flowers, and the suggestion of the bird's beak, which gives the genus its name, is found in the long slender rostellum to which the pollen masses are attached. The plant is usually grown in peat and sphagnum in a small pan suspended near the roof of a greenhouse.

Ornithogalum, or Star of Bethlehem, genus of bulbous plants (family Liliaceae), bearing racemes of white, greenish-white, or yellow flowers. They are never blue as in the closely allied genus *Scilla*. The only true Brit. species is *O. pyrenaicum*, the spiked star of Bethlehem. A number of varieties are grown in warm borders or as pot plants.

Ornithoglossum, genus of bulbous plants (family Liliaceae), occasionally grown in the greenhouse. *O. glaucum*, with greenish-brown flowers, and *O. undulatum*, with purple-green flowers, both natives of S. Africa, are the prin. species.

Ornithology, branch of zoology which teaches the hist. of birds. See BIRD.

Ornithopter, form of flying machine

operated by flapping wings; none has ever proved successful in practice.

Ornithorhynchus Anatinus, Duck Mole, or Duck-billed Platypus, Australian mammal which, with the two spiny ant-eaters, forms the primitive group, Monotremata. Prototheria is Huxley's name for those primary mammals from which, it was conceived, the Monotremata were evolved. This latter is a class added by Lamarck for *O.* and echidnas. They are also regarded as a sub-class of mammals, Ornithodiplia. Except for the fact that the young are produced from eggs, and for the flat beak-like mouth, *O. A.* bears no resemblance to a bird. It lives in long burrows on the banks of rvs. The eggs are laid two at a time in a small chamber at the end of the burrows. These eggs have a non-calcareous shell, but like those of birds and other egg-laying vertebrates, have a yolk. The young are believed to hatch very soon after the eggs are laid, and are at first naked and blind. In an early stage, the short fleshy bills are provided with teeth, and these are lost as the animal matures, and hard horny patches developing in each jaw take their place. The oval, flattened body becomes clothed with fur, which is well adapted to an aquatic existence, and the feet are webbed. The fore-limbs are provided with five powerful claws with which the animal burrows. The broad, flat tail is short, and the total length of the body is about 20 in. A horny spur on the hind foot, which is able to inflict a poisonous wound, occurs only in the male.

Oro, or El Oro, S.W. prov. of Ecuador. Cacao is the prin. product, and gold is found. The cap. is Machala. Area 2338 sq. m. Pop. 77,530.

Orobanchaceae, family of leafless, scaly, succulent plants, which are parasitical on the roots of other plants or which live upon decaying organic matter. Among the genera are *Orobanche* and *Lathraea*, both of which are represented by Brit. species.

Orobanche, or Broomrape, genus of parasitic plants, with many-sided spikes of flowers, usually of a brownish colour. *O. purpurea*, a rare parasite on milfoil, has, however, pale blue flowers with purple veins. *O. major* and *O. minor*, the commonest species, are both parasitic on leguminous plants, and sometimes cause considerable loss to crops.

Orobis, or Bitter Vetch, genus of leguminous plants, usually classified with the genus *Lathyrus*, but without the tendrils which characterise its members. The roots of *O. tuberosus* (*Lathyrus macrorrhizas*), which bears variegated purple axillary flowers, are sometimes eaten in the Scottish highlands. *O. lathyroides* is a handsome garden plant.

Oronsay, see COLONSAY AND ORONSAY.

Orontes, or Nahr-el-Asi (The Rebel-lous), riv. of N. Syria, which rises in the Anti-Libanus, and flows first N., through Lake Kadz., to Antioch, and then turns W.S.W., and enters the Mediterranean Sea, 40 m. N. of Latakia. Length 250 m.

Orooniah, see URMIAH.

Oropesa float, mine-sweeping device comprising a pear-shaped float on the end

of a wire and moving at an angle to the ship. The wire is held to a set depth by a kite, and cuts the mooring cable of mines by being serrated.

Oropus, *ant.* *tn.* and seaport of Greece in Attica, 23 m. N. of Athens. Its possession was the source of continual strife between the Athenians and Boeotians from the sixth century B.C. to 338 A.C., when it came into undisputed possession of the Athenians.

Oroya, *tn.* of Peru, 137 m. from Callao, at the junction of the Central Railways and the Cerro de Pasco Railways. The *tn.* which stands at an altitude of 12,180 ft., is situated at the confluence of the Mantaro and Yauli Rs. The chief activity is the smelting of copper ore. Pop. 15,000.

Orpen, Sir William Newenham Montague (1878-1931), Brit. painter, son of Arthur Herbert O. of Stillorgan, co. Dublin. At the age of eleven he went to the Metropolitan School of Arts, Dublin, and, later, to the Slade School. O. was one of the artists chosen by the gov. to paint pictures of the First World War, being given the rank of major. He was knighted in 1918, and in 1921 he became president of the International Society of Painters and Gravers. His war pictures, many of which he presented to the nation, show scenes tragic, comic, and grotesque, according as the subject struck his fancy; they are forceful and to the point, but artistically remain acerbic and dramatisations of his emotions rather than generalisations. Among the best known of these are 'Changing Bibles' and 'Bombing at Night.' His best pictures are genre subjects and interiors with figures such as 'The Fracture,' 'Homage to Manet,' 'A Bloomsbury Family' (that of Mr. Wm. Nicholson). He painted many portraits, including 'The Hon. Percy Wyndham' (1907), a notable early example of his powers, 'Dame Madge Kendal,' and 'Sir Ray Lankester,' all of a rather mechanical brilliance. A portrait of himself holding a 'Dead Ptarmigan,' and another of 'Alfred W. Rich, Esq.,' are examples of excellent sketching. Among his pictures of Irish life, 'The Irish Wedding' and 'Sowing the Seed in the West' are greatly admired. Undoubtedly a great draftsman, as a painter he was rather the brilliant executant than the great craftsman. See memoir by P. G. Konody and S. Dark, 1932.

Orpheus: 1. In Gk. legend, the son of Oeagrus by the muse Calliope, and the most illustrious poet of the pre-Iliadic period. He lived in Thrace, and accompanied the Argonauts on their expedition. O. was presented by Apollo with a lyre, on which he played so exquisitely that not only every living thing but rivers and rocks were moved by his sweet harmony and obeyed his will. He married the nymph Eurydice, who died from a serpent's sting. Resolved to recover her, O. dared to descend into Hades. The music from his lyre gained him entrance, and so far captivated Pluto that he consented to his prayer on condition that he should not look back at his wife until they reached the upper world. But when he had almost

reached this earth O. turned to see if she were following him, whereupon Eurydice vanished before his eyes. He then retreated in his grief to the mt. caves and scorned the amorous advances of the Thracian women, who, in revenge, tore him limb from limb in Bacchic frenzy and threw his head into the Hebrus. The muses collected his remains and buried them at the foot of Olympus, while Zeus placed his lyre among the stars. 2. Mythical founder of a school of mystic theology which flourished at Athens during the sixth century B.C. Orphism resembled the Thracian worship of Dionysus. See E. W. Maass, *Orphicus*, 1895;



THE DEATH OF ORPHEUS
A vase in the British Museum.

Jane E. Harrison, *Prolegomena to the Study of Greek Religion*, 1908; and W. K. C. Guthrie, *Orpheus and Greek Religion*, 1935.

Orphica, number of early Gk. poems on mystic subjects. They were once ascribed to Orpheus, but many of them were written during the fourth century A.D. The chief poems of the Orphic cycle are the *Argonautica* an epic poem on the voyage of the Argonauts; *Lithica*, a poem on the properties of stones; *Physica*, and *Mimus*. See A. Dieterich, *De Hymnis Orphicis*, 1891; eds. of the *Orphica* by Hermann, 1805, and Abel, 1885; and an Eng. trans. of the *Hymns* by T. Taylor, new ed., 1896.

Orpiment, native triarsphide of arsenic which occurs in lemon-coloured crystals in Czechoslovakia, Rumania, the U.S.A., Kurdistan, and elsewhere. Formerly it was used as a dye.

Orpington, *urb.* dist. of Kent, England, mainly residential and agric. There was a printing press here in 1873 for printing Ruskin's own works, superintended by George Allen, who was also his publisher.

The parl. constituency of O. includes part of the Darford rural dist. Pop. (estimated) 59,000.

Orr, John Boyd, first Baron Boyd-Orr (b. 1880). Scottish physiologist and nutritional expert, b. at Kilmaurs, Ayrshire; he was educated at Glasgow Univ., where he took his M.A., M.D., and D.Sc. degrees. He entered the medical profession but gave up his practice to study animal nutrition at the Rowlett Institute of Animal Nutrition, Aberdeen, of which he was director until his retirement in 1945. During the First World War he served with the Royal Army Medical Corps. His work on *Minerals in Pasture and their Relation to Animal Nutrition* appeared in 1928, and four years later he became a member of the Reorganisation Committee for the Fat Stock Industry. He also served on other gov. organisations concerned with animal nutrition and milk supply. His researches, embodied in *The National Food Supply* (1931) and *Food, Health, and Income* (1936), were the basis of the rationing system in the Second World War. He was professor of agriculture at Aberdeen Univ. from 1912 to 1945. In the latter year he was elected M.P. for the Scottish Unions, but resigned in 1946 on account of his work with the United Nations Food and Agric. Organisation, of which he was director-general. It was a period of acute world food shortage, and his proposals were successful in averting a famine situation. On his retirement from the Food and Agric. Organisation he became chancellor of Glasgow Univ. (1947). He was knighted in 1935 and created a baron in 1949. He was awarded the Nobel Peace prize for 1949.

Orrell, tn. of Lancashire, England, 4 m. W.S.W. of Wigan. There is a cotton mill, sand and gravel quarry, and farming in the neighbourhood. Pop. 7000.

Orrery, Earls of, see BOYLE.

Orrery, instrument deriving its name from the one constructed for Charles Boyle, earl of Orrery, by Rowley, 1715. It was an improved form of the sixteenth-century planetarium (a machine for exhibiting the relative motions of the planets and their positions in respect to the sun and one another) invented, or at least constructed, by George Graham (1672-1750), and showed the motions of the members of the solar system, with relative sizes and distances, but circular orbits, by means of arms and uprights moved by geared wheels. A good example is to be seen in the Kelvin Grove Museum, Glasgow, and Thomas Tompion, the famous London clockmaker, also constructed an O.

Orrievsk, see BERICHEV.

Orris Root, rhizome of *Iris florentina*, a violet-scented plant occurring in S. Europe. A starch or flour is prepared from the rhizome for use in the manufacture of toilet powders, especially dentifrices. The plant is cultivated for the purpose in the N. of Italy, and is sometimes grown in Brit. gardens.

Orrs, Eugenio D' (b. 1882), art critic, was b. in Catalonia. He became director of

public instruction in Barcelona. Under the *nom de plume* of Xenius he was regarded as the champion of catalanism. About 1920, however, he began to separate himself from his Catalan friends, and to write in Castilian. As art critic he has been one of those who battled for fuller recognition of what Portugal contributed to art. One of his finest books is his *Life of Goya*.

Orsav, see D'ORSAY.

Orsborn, Albert William Thomas (b. 1886), see under SALVATION ARMY.

Orsha, and, tn. in the Moghilev Region of the Byelo-Russian S.S.R., 74 m. W.S.W. of Smolensk, and a railway junction. There is a trade in grain, seeds, and timber, and before the Second World War there were also tanneries and lime-kilns. Now factories had been constructed, or were under construction before the Ger. invasion, and the lime factories were among the most important in Russia. The dam which is projected at O. will raise the level of the Dnieper and enable large river vessels to sail into Smolensk. O. was lost to the Russians in the Ger. invasion of 1941, but at the end of Sept. 1943 the Russians were pouring through the Smolensk gateway and preparing to attack the fatherland line, a line between Vitebsk in the N. and the Pripet marshes in the S., marked by a series of strongholds among which O. was one. Vitebsk held out tenaciously under its Ger. garrison until summer 1944, and a new Russian drive was launched on June 23, with that place as its focal point. Gen. Chernyakovsky broke the defences N.E. of O., and on June 27 the Gers. were driven out of that tn. Pop. 30,000. See further under EASTERN FRONT IN SECOND WORLD WAR.

Orsini, Giovanni Gaetano, see NEPOLES (popes), *Napoles III.*

Orsk, tn. of the Chkalov Region of the R.S.F.S.R., 155 m. S.E. of Orenburg (now Chkalov), near the confluence of the Ural and Or Rs., originally a fortress on the Orenburg line against the Kazan. There is oil-refining, a pipe-line connecting with the R. Emba wells, chrome and nickel deposits, tallow, soap, and brick works, railway workshops, and an electric power station. Pop. 65,800.

Orsova, name of two tns. of Rumania, on opposite banks of the Danube, at the Iron Gates. Old O. on the W. bank of the R. Corina, is a trading and shipping centre. Pop. 6000. New O., on the opposite bank, was repeatedly taken and retaken in the wars of the eighteenth century. Pop. 3000.

Ortega, Cape, promontory, and the most N.-westerly point of Spain on the bay of Biscay, 3.5 m. N.E. of Corunna. A battle was fought off it in 1805 between Sir Richard John Strachan and a small Fr. fleet, survivors of Trafalgar, all the ships of which were captured or sunk.

Ortega y Gasset, José (b. 1883), Sp. essayist and philosopher, b. at Madrid, educated at the Jesuit school of Miraflores and the Univ. of Madrid, where he graduated in philosophy and literature in 1904.

In 1908 the univ. conferred upon him the chair of metaphysics. During the following years O. founded and wrote for the philosophical journals *Faro* (1908) and *Europa* (1911). Always of a retiring disposition, O. became famous in 1911 through his speech on 'Old and New Politics,' in which he denounced the restoration of the monarchy and Alfonso XIII. personally, and as a result of which the League of Political Education was estab. Among O.'s prin. works are *The Revolt of the Masses* (1932); *Invertebrate Spain* (1937); and a *Philosophy of History* (1941).

Ortelius Wortels (Ortel, or Ortell) Abraham (1527-98), Flemish geographer and mathematician, b. at Antwerp, of Ger. parents. His *Theatrum orbis Terrarum* (1570) was the first great atlas, and he also wrote *Synonymia Geographica* (1578). In 1575 he was appointed geographer to Philip II. of Spain, and two years later he came to England and helped to induce Camden to produce his *Britannia*.

Orthez, tn. of France in the dept. of Basses-Pyrénées on the Pau, here crossed by a fourteenth-century bridge, 25 m. N.W. by W. of Pau. The viscounts of Béarn had their cap. here in the thirteenth century. O. was a Calvinist centre. It was the scene of a battle in 1814, one of the last actions of the Peninsular war, in which Wellington defeated Marshal Soult. Pop. about 6200.

Ortho-acids, name applied to substances containing one or more —C(OH), groups. They are known in the form of their derivatives, the free acids being unstable, rapidly losing water with the formation of ordinary acids containing the —CO OH group:



Orthoceras, large genus of fossil cephalopods in the order Tetrabranchiata and family Nautilidae. The species have a simple aperture, and the shell is quite straight. The genus is closely allied to the living one, *Nautilus*, but itself occurs only in the fossil form; it is found from the lower Silurian to the Lias. *O. titan* is the term applied to a huge species.

Orthochromatic Photography, see under PHOTOGRAPHY.

Orthoclase Porphyry, hypabyssal rock which may be regarded as intermediate between plutonic syenite and volcanic trachyte. It occurs in dykes and veins, and is composed of a micro-granitic groundmass with little or no free quartz, and containing relatively large phenocrysts of orthoclase feldspar. Micaceous varieties are sometimes called mica-trap, which term includes the orthoclastic type of lamprophyre, viz. minette.

Orthodox Eastern Church, see GREEK CHURCH.

Orthodoxy (literally, right opinion), correct belief, especially in religious doctrine, but also in philosophical, social, or political principles. Belief not orthodox, but not too inimical, is *heterodoxy*; while denial or holding incompatible opinions is *heresy*. Each religion or sect naturally

has its own O., which may vary in different periods of its hist. The term may be applied in general to beliefs consistent with the Scriptures, but each religion or sect usually formulates its own dogma in creeds or by reference to the ideas of founders or prominent teachers. Formal acceptance of the Thirty-nine Articles constitutes O. in the Anglican Church. The Gk. or E. Church is often referred to as the Orthodox Church, claiming to be the most faithful conservator of the primitive faith.

Orthography (Gk. *orthographia*, correct writing), art of accurate spelling. Such accurate spelling should properly be a reliable guide to the pronunciation of the word spelt, but since the number of symbols used for the representation of speech seems always to have been less than the number of sounds used, it is probable that O. has never perfectly served its purpose. It. and Sp. are still mainly phonetic, Ger. is less so, while Eng. and Fr. are far from the ideal. Before the Conquest Eng. was more or less phonetic. During the period from the Conquest to the introduction of printing, roughly, that is to say, during the Middle Eng. period (see ENGLISH LANGUAGE), the same state continued. Even at this time, however, the need of reform was felt, as is shown by Orm or Ormin's attempt at phonetic spelling, the O. of the *Ormulum* (q.v.) being the most valuable extant source of information on the development of sound in Middle Eng. During the Middle Eng. period pronunciation and dialect varied in the sev. parts of the country. The spelling often differed. There were conventional representations of the various sounds, but there were not conventional representations of whole words. Even the introduction of printing did not finally fix the O., and the attempt was still made to make the spelling of the word represent the pronunciation. But there was now less freedom of change in the spelling, which became almost fixed by the end of the seventeenth century. Pronunciation, however, went on changing, and now the spelling has not only ceased to be a guide to pronunciation, but in many cases it has become a positive hindrance. It seems hardly necessary to cite examples to prove the inadequacy of our present symbols. Whereas we have but twenty-three symbols (c, x, and g are supernumerary), there are from thirty-eight to forty-four sounds to be represented. Even in the use of our few symbols there is much inconsistency. Especially is this true with regard to the vowels. Taking an example at random, we see, for instance, the short e sound represented not only by e as in *set*, *fed*, *nettle*, but by a as in *many*; by ea as in *feather*, *leather*; by ai as in *said* and *against*; by ei as in *heifer*; by eo as in *jeopardy* and *leopard*; by ei as in *leisure*, by ay as in *says*. In the present century, however, a movement has arisen for a reform in this direction, although with little headway even in America. See also SIMPLIFIED SPELLING.

Orthopædic Surgery (Gk. *orthós*, straight; *naîs*, child), branch of surgery concerned

with bones, joints, muscles, nerves, and any tissues so injured or diseased that deformity or impairment of function may result; its applications are by no means confined to children. The main types of affections treated in O. S. are: (1) Affections of joints. These affections may be due to bacterial infection or to injuries such as fractures, bad sprains, or repeated minor injuries. (2) Affections of bone may similarly be due to infection or to injury. The growth of bone may also be affected by certain disturbances of the endocrine secretions, by deficiency of antirachitic vitamins, and by tumours. (3) Diseases or contraction of the soft tissues such as skin, muscle, and tendons near joints may cause deformity. Contraction due to injury may sometimes be prevented by sterilisation of the wound, and, if necessary, subsequent appropriate skin- or tissue-grafting. Gradual stretching will correct some forms of contraction. Infected or injured bursae, the lubricating sacs over the joints, are other frequent causes of deformities such as bunions and housemaid's knee. (4) Affections of the nervous system include obstetric injury to this system, degeneration of nerve tracts, cerebral lesions, and infantile paralysis. The latter is a highly infectious epidemic disease, in which the muscles supplied by the affected nerves become paralysed and atrophied. Various workers claim to have prepared a curative serum, but this has not yet been tested sufficiently. The treatment in general use consists in the application of suitable apparatus to prevent deformity, and, later, of massage and electricity to restore muscular activity. (5) Most deformities are 'static,' and mainly due to bad postures. Flatfoot, round shoulder, and hollow back are some of the commonest static deformities. (6) Congenital affections result from abnormal embryological development, and their causes are not fully known. Congenital clubfoot, flatfoot, dislocation of hip, affections of the vertebral column, are amongst other congenital faults treated by O. S. See Sir R. Jones and R. Lovett, *Orthopaedic Surgery*, 1923; R. Whitman, *Treatise on Orthopaedic Surgery*, 1927; E. A. Crook, *Aids to Orthopaedic Surgery*, 1929; and W. C. Campbell, *Textbook of Orthopaedic Surgery*, 1930.

Orthophosphoric Acid, see PHOSPHORUS.

Orthoptera (Gk. *orthos*, straight; *pteron*, wing), large order of insects containing over 13,000 species, among which are such well-known creatures as grasshoppers, crickets, cockroaches, leaf- and stick-insects. They are characterised by their conspicuous and biting mouth-parts, stiff tegmina, and membranous metathoracic wings, which close like a fan when in repose; the wings are frequently either reduced or absent, and there is no abrupt metamorphosis.

Orthoptics, see REFRACTION, ERRORS OF. *Night-testing*, and *under SQUINT*.

Ortho-Sulphobenzimide, see SACCHARIN.

Orduña, health resort of Spain, in the prov. of Coruña, on the Santa Marta estuary, 23 m. N.E. by E. of Ferrol. Pop. 21,600.

Ortler Group, group of the E. Alps, forming the watershed of the Adige, Adda, and Oglio R. basins. The Ortler, or Ortler Spitze (12,810 ft.), the highest summit in the group, is in the Trentino, Italy. It was once regarded as the loftiest mt. in Europe and quite inaccessible, but in 1804 it was ascended by Josef Piebler and other Tyrolean mountaineers. Goblard climbed it in 1803, and the discovery of easier routes in 1865 caused the ascent to become popular with tourists.

Ortolan (*Emberiza hortulana*), member of the hunting family, common in Europe and W. Asia, but a rare visitor to Britain. It spends the winter in Africa, and is netted in great numbers while migrating. It rapidly fattens after being fed for a short time on oats, millet, and other grain, and is then killed for the table, being highly valued by epicures. The O. somewhat resembles another bunting, the yellowhammer, but its head is grey. The upper surface is reddish brown with black streaks, the throat yellow, and the under parts greenish-olive. The nest is made on the ground or on banks, and in it are laid about five eggs.

Orton, Arthur, see *under* TUBEROSE CASE.

Ortona a Mare, com. and episcopal seat of Italy, in the prov. of Chieti, 12 m. E. of the tn. of Chieti. It is situated on a cape in the Adriatic Sea, and possesses a small harbour, used chiefly for coasting trade. It contains a cathedral and a ruined castle. The cathedral was badly damaged by bombardment in the Second World War, half the building, together with the campanile and sculptured portal, and the portico being demolished. The Aragonese Castle and the Farnese Palace were also badly damaged, and the Pizzi Palace completely destroyed. Pop. 19,895.

Ortygia, see SYRACUSE.

Ortyx, see QUAIL; VIRGINIAN QUAIL.

Oruro, city of Bolivia, cap. of the dept. of the same name. The dept. has an area of 20,380 sq. m. and an estimated pop. of 203,500. The tn. is the seat of a bishop and the headquarters of a military dist. It is the hub of the Bolivian railway system and the centre of its great tin-mining area. Silver, copper, and wolfram are also worked in the dist. The city stands at an altitude of 12,100 ft. and the nights are very cold. There is a large power station. The pop. is 18,000 largely Indians, and there are a number of Eng.-speaking mining officials.

Orvieto, walled city of Italy in the prov. of Perugia, on the r. b. of the Paglia, 60 m. N.N.W. of Rome. It has been the seat of a bishop since A.D. 509. One of the caps. of the Etruscan League, there are tombs of the fifth century B.C. The cathedral, a beautiful specimen of the It. Gothic, built of black-and-white marbles, dates from the thirteenth century. There is trade in corn, silk, and a delicate white wine. Pop. 19,000.

Orwell, first known as the Gipping, riv. of England, in Suffolk. It has its source a few miles W. of Stowmarket, through which it passes, flowing also through

Needham Market. Below Ipswich it forms the estuary known as the O. The riv. is navigable to Stowmarket.



THE ORWELL ESTUARY AT PARKSTON
CLAY, HARTWICH

Oryol, see ORILL

Oryx, important genus of antelopes, belongs to the sub-family Hippotraginae, and contains six species, natives of Africa, Arabia, and Syria. Both sexes have long, annulated horns, and the female possesses four mammae. *O. leucorhynchus* (the leucorhynch), *O. beatrix* (the Beatrix antelope), *O. gazella* (the gazelle), and *O. baysa* (the baysa) are the four best-known species.

Orzesko, Elise, née Pawlowska (1842-1910), Polish writer, b. near Grodno, Lithuania. She deals mainly with two themes, the misery of the peasants and the desolation of the Jews in their ghettos. In *Meir Ezafowicz* (1878), her best novel, she symbolises the two currents that exist in all these ghettos, assimilation, and complete religious, cultural, and social separation. Other books, *Eli Makower* (1875), on the relations between the Polish nobility and the Jews; *On the Niemen* (1888), on the Polish aristocracy (of which she was a member); *On Lost Souls* (1886), on country life in White Russia; and *Gloria Victis* (1910).

Osage, riv. of U.S.A., rises in S.E. of Kansas as the Marais des Cygnes. Entering the state of Missouri, on the S.W., it flows E.N.E., and bearing N.E. it enters the Missouri R., joining it on the r. b., 10 m. from Jefferson City. Length 494 m.

Osage Orange (*Maclura aurantiaca*), hardy deciduous tree, native of N. America. It is usually spiny, and bears yellow or greenish shiny leaves and small white or green flowers, which are followed

by large golden fruits, filled with a foetid slime.

Osaka, largest city of Japan, 30 m. from its seaport of Higo, is situated on a large riv. on the S.E. coast of the Is. of Honshu, in the most central and populous part of the empire, and surrounded by the great tea dists. Before the Second World War it was the great emporium of trade and luxury. It had over 7000 flourishing factories, producing textiles, glass, metal goods, leather goods, ships, etc., and exported chiefly to Korea and China, large quantities of sugar, straw goods, and textiles. There is a fine castle. It suffered from a disastrous earthquake in 1891, and from fire in 1909. By the treaty of 1858 Brit. subjects were to be allowed to reside in O. for the purpose of trade from Jan. 1, 1868. O. was much damaged by Amer. bombers in June-July 1945. Following a raid by super-fortresses, June 1, some 400 super-fortresses bombed O. again on June 7; again bombed June 8, 14, and 19, the raid of June 11 being especially severe. Industrial targets S. of O. were hit on July 3, and an oil refinery N. of it on July 9. Then on July 24 some 700 super-fortresses bombed the town together with others. Pop. (1940), 3,252,300. See further under PACIFIC CAMPAIGNS IN SECOND WORLD WAR.

Osawatimie, tn. of Miami co., Kansas, U.S.A., 45 m. S.W. of Kansas City, on the Missouri Pacific railroad. It is in an agric. dist., and has railroad shops. Pop. 4100.

Osbeckia, genus of deciduous or evergreen herbs or shrubs (family Melastomaceae), bearing racemes of red, purple, violet, or yellow flowers.

Osborn, Henry Fairfield (1857-1935), Amer. paleontologist; b. at Fairfield, Connecticut. In 1890 he became Dr Costa prof. of zoology, Columbia Univ., and dean of faculty of pure science there 1892-95. Curator of vertebrate paleontology in Amer. Museum of Natural Hist., 1891-1910, he was later research prof. of zoology, Columbia Univ.; paleontologist to the Canadian Geological Survey, 1900-1904, and to the U.S.A. Geological Survey after 1900. Celebrated for reconstruction of prehistoric mammals, his works include *From the Greeks to Darwin* (1894); *Evolution of Mammalian Molar Teeth* (1907); *The Age of Mammals* (1910); *Men of the Old Stone Age* (1915); *Origin and Evolution of Life* (1917); *Impressions of Great Naturalists* (1921); *Evolution and Religion in Education* (1926); and *Man Rises to Parnassus* (1927).

Osborne, Dorothy (1827-95), daughter of Sir Peter O., who held Ghornacy for the king in the Civil war, and wife of Sir Wm Temple, Eng. diplomat and essay writer, whom she married in 1655. Her letters to him during their long separation before marriage have a very great charm. See Macaulay's brilliant essay on her husband, and E. A. Parry (ed.) *Letters from Dorothy Osborne to Sir William Temple*, 1888, ed. by G. C. Moore-Smith, 1928; also Lord D. Cecil, *Two Quiet Lives*, 1947.

Osborne, Francis, see LEBDS, DUKE OF.

Osborne House, formerly one of the favourite residences of Queen Victoria, in the Isle of Wight, 1 m. S.E. of Cowes. Queen Victoria died there in 1901, and the estate was willed to the Prince of Wales, who, on his coronation as Edward VII. in 1902, made a gift of the building and grounds to the nation, to be used as a convalescent home for officers of the army and navy.

Osborne Judgment, trade union action brought in the king's bench div., taken to the court of appeal and, finally, to the House of Lords (1909). The decision declared null and void a trade union rule which provided for an enforced levy on members towards the payment of the salaries of M.P.s, and thereby checked the growing political power of the unions.

Osbourne, Lloyd (1868-1947), Amer. novelist and collaborator with R. L. Stevenson in some of the latter's stories; b. at San Francisco, son of Samuel O. and Fanny van de Grift, his wife, whom Stevenson married in 1880. It was at Braemar, in 1881, that, to please his stepson, Stevenson wrote *Treasure Island*. O. was educated at private schools in Paris and Lieuwert, and at Edinburgh Univ., where he studied engineering. Thereafter he was nearly always with the Stevensons. Stevenson encouraged O. to write, and O. collaborated with his stepfather in writing *The Wrong Box* (1889); *The Wrecker* (1892); and *The Rbb-Tide* (1894). Collaboration with so famous an author has tended to obscure O.'s individual merits and indeed O. was only twenty-six when Stevenson died. O. alone invented and wrote *The Wrong Box*, which Stevenson only touched up after its completion. The earlier part of *The Wrecker* was entirely O.'s work, but Stevenson invented the character, James Pinkerton, and wrote the last four chapters, besides more than four others (including the Paris scene), or about one-third of the book. *The Rbb-Tide* was jointly planned and written throughout in intimate collaboration, but Stevenson completed the story, and largely rewrote most of it. O., however, was himself a first-rate story-teller, apart from the inspiration and guidance he received from Stevenson, and he knew well the S. Seas which are the background of much of his work. With his sister, Mrs. Strong, he wrote *Memories of Tahiti* (1903) on life in Samoa; in collaboration with his nephew, Austin Strong, he wrote two plays entitled *The Little Father of the Wilderness* (0000) and *The Exile* (0000), which latter was produced by Sir John Martin-Harvey. In 1887 he was U.S.A. vice-consul for Samoa, where he resided with Stevenson till the latter's death in 1894. After Stevenson's death he left Samoa in 1897, with his mother, and eventually made his home in the U.S.A. His separate pubs. include *Love the Fiddler* (1903); *The Motor-maniacs* (1906); *Three Speeds Forward* (1907); *The Adventurer* (1907); *Harm's Way* (1909); *The Kingdoms of the World* (1911); *Wild Justice* (1922); *An Intimate Portrait of R. L. S.* (1924); *The Grierson Mystery*

(1928); *Peril* (1929); and contributions to many magazines.

Osea, see **HUESCA**.

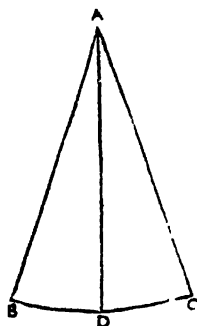
Oscans (*Oscæ lingua* was the Lat. term for their speech), or **Osci**, in Gk. "Ὀσκι", or "Ὀσκιον", from *Opaci* or *Opici* (terms connected with the indigenous word *opus* or *opacum*, in Lat. *opus*, meaning work, to work), were Italic tribes who inhabited S. Italy in the first millennium B.C. About 200 Oscan inscriptions are extant; 150 of them have been found in Campania. They belong mainly to the third and second centuries B.C., but some inscriptions may be dated in the fifth century B.C., others down to the Christian era. The most carefully engraved of them is the *Cippus Abellanus* of the first half of the second century B.C., containing a treaty for the joint use of a temple by the inhab. of Nola and Abella. The longest is the *Tabula Bantina* of the second half of the second century B.C., containing the local laws. The most important is the *Tabula Agnonensis*, of the mid third century B.C., containing a list of local divinites. There is an inscription from Messina (in Sicily), and a variety of short inscriptions come from Pouzzol. Oscan coins have been found dating from the fifth to the first century B.C. The Oscan script was an offshoot of the Etruscan alphabet. The careful spelling and engraving of the inscriptions, the precise differentiation of sounds, the invention of the letter-sign *u* for *u*, which did not exist in Etruscan, and of *i* for *iu* open *i*, indicate the development of script and language.

The O. till their ruin in the Hannibalic war, had a higher civilisation than the contemporary Romans, and very probably possessed a literature. Their language was one of the most important of the Italic dialects, belonging to the same linguistic branch as Lat. This branch can be subdivided into two groups, Italic proper (Oscan, Umbrian, Sabelian and some minor dialects, such as Pelignian, Volscian, Marrucinian, Sabine) and Latinian (Lat. and Faliscan) (see under **INDO-EUROPEAN LANGUAGES**). These two groups can be distinguished as P-group (Italic proper) and Q-group (Latinian), one of the most remarkable characteristics of their divergence being the fact that in the former group the Indo-European guttural-velar sound *q* and *q'* are represented by *p* and *b*, while in Latinian they are represented by *q* and *u* or *gu*, following *u*; e.g., Lat. *quis* Oscan *pis*; *uenerit* *benust*. See further under **LATIN LANGUAGE AND LITERATURE**.

Oscar I. (1798-1859), king of Sweden and Norway. Son of Bernadotte. Although proposals to reform the constitution proved abortive in his reign, much was done to promote the national welfare, especially in freedom for industry and trade, efficiency of communications, and reform of the criminal law. The Malmo armistice between Denmark and Germany (1848) in the war over Schleswig-Holstein was brought about by Swedish influence. In 1857, owing to O.'s ill-health, his son (afterwards Charles XV.) became regent.

Oscar II. (1829-1907), king of Sweden and Norway (of the latter until 1905), son of Oscar I., b. in Stockholm. In 1856 he married Princess Sophia, daughter of Duke Wilhelm of Nassau, and in 1873 succeeded his brother, Charles XV., as king of Norway and Sweden, being crowned in the cathedral of Drontheim (Norway). When Norway separated herself from Sweden (1905) it is attributed to King Oscar's broad mind and insight that there were no serious popular uprisings (see NORWAY, SWEDEN, HAAKON VII.). During his reign great strides were made in national development, scientific research, geographical discovery, and industrial enterprise. He wrote *Memorials of the Swedish Fleet* (poems); *Military History of Sweden, 1711-13* (1861-67); a trans. of Herder's *Cid*; a poetical version of Goethe's *Torquato Tasso* (1861), and *Memoirs of Charles XII.* (Eng. trans., 1879). See A. de Maricourt, *Oscar II.* *Intime*, 1906.

Osoola (Seminole, *As-se-ho-lar*), chief of the tribe of Seminole Indians in Florida, U.S.A. In 1835 the Indians rose in rebellion against being transferred to reservations W. of the Mississippi R. Amer. troops were sent against them. In Dec. Maj. Dade and 100 soldiers were massacred in a Florida swamp, and on the same day O. killed and scalped Gen. Wiley Thompson, commander of the Amer. forces. For a long time O. and his men held out, and hundreds of Amer. soldiers perished of fever in the swamp. He was taken prisoner at last while holding a conference under a flag of truce, an act of inexcusable treachery, though represented as one of retaliation, and confined in Fort Moultrie until his death. Gen. Jess-up, who captured O., was severely censured for his act, but he contended that it was the only way to stop the career of the treacherous chief. However, the war went on for about seven years, costing the U.S.A. \$30,000,000.



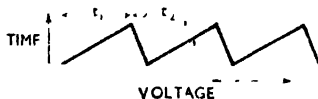
OSCILLATION

Osoersleben, tn. of Saxony-Anhalt, Germany, on the Hode, 12½ m. N.N.E. of Halberstadt. Textiles, foods, and engineering goods are produced. O. was heavily raided by Amer. bombers on Feb. 20, 1944. Pop. 14,100.

Osei, see OSCANS.

Oscillation. A body is said to oscillate when it moves backwards and forwards like a pendulum. The verb to oscillate means to swing to and fro or to vibrate. The body need not vibrate by virtue of its own elasticity merely. The motion of a pendulum is the typical oscillatory motion. Suppose the bob is displaced from D to B, and then released. It swings along the arc BC and then back along CB, and so on. It oscillates along BC. BD is the amplitude of O. Suppose the bob is moving through D in the direction BC. The time taken before the bob moves again through D in this same direction is called the period of O. For any given pendulum of constant length this period is always the same if the pendulum is not restrained. This period is termed the natural period of O., and is defined as the period of a body which is set oscillating and left to itself. But a body may execute forced O. If it is acted on by an alternating force of definite period, it ultimately oscillates in a period coincident with that of the force and not with its own natural period. The centre of O. is the point of an oscillating body such that if the whole mass of the body were concentrated there, the time of O. would be unchanged. It coincides with the centre of percussion of the body. See also under CENTRE.

Oscillograph, electronic measuring instrument used for the study of wave-form of rapidly recurring voltages over a wide range of frequencies. The phenomena to be examined are presented to the viewer as a graph of voltage plotted against time on the fluorescent screen of a cathode ray tube (see VALVES; TELEVISION). The tube used invariably employs electrostatic deflection of the beam in either the horizontal or vertical direction. The heart of an O. is the time base on whose accuracy and linearity much of the instrument's usefulness depends. The time base circuit is concerned entirely with the horizontal deflection of the beam. It is essential that the fluorescent spot on the screen shall move at a constant speed during its forward or operative stroke, returning, on completion, to its starting point in the shortest possible time. To this end, the time base generates a voltage of the form illustrated in the accompanying diagram. It will be seen that during the time of the forward stroke t_1 the build-up of voltage is linear, while, during the flyback or return stroke



GENERATION OF VOLTAGE IN TIME BASE

(t_2 , the voltage collapses and the spot returns to the beginning of its trajectory in a fraction of the time taken for its initial excursion. An O. time base is

provided with controls which enable the cycle just described to be varied in frequency from a few cycles per second up to sev. kilocycles. These controls are often calibrated in frequency so that the composition of any wave-form being examined may be directly measured with respect to time.

Vertical deflection of the spot is carried out by applying the voltage to be examined to the vertical deflecting plates of the cathode ray tube, either directly or through amplifiers built into the instrument. These amplifiers must possess a flat and uniform response up to the frequencies of a few megacycles if they are to handle all types of wave-form without distortion, and their design must be carried out with considerable care. Provision is invariably made in the O. to enable the wave-form under examination itself to 'trigger' the time base independent of the frequency controls of the latter. This synchronising control injects a fraction of the incoming voltage into the time base controlling circuit so that a wave-form whose repetition frequency is not constant can be held steadily on the screen for viewing.

The O. is to-day one of the most useful tools developed for the use of the electronic engineer. With its aid complicated wave-forms can be examined easily and in detail which is essential in such applications as radar (*q.v.*) and television (*q.v.*). More recently it has been called to the aid of the mechanical engineer for the measurement of vibrations in engines and other structures such as airframes, etc.

Osh, tn. of the Kirghiz S.S.R., in the region of the same name, on the R. Ak-Bura, 55 m. N.E. of Marghilan. There are silk-mills. New roads have been built to Khorov, Frunze, and Stal'nabad. Pop. (1933) 44,800 (1935) 29,000.

O'Shaughnessy, Arthur William Edgar (1844-81), Eng. poet, b. in London. He was for a time, from 1863, assistant in the zoological dept. of the Brit. Museum. In 1870 he pub. *An Epic of Women, and Other Poems*. This vol. met with great applause, but he was not so successful in his next venture, *Lays of France* (1872), nor in his third vol., *Music and Moonlight* (1874). His songs of *a Worker*, ed. by A. W. N. Deacon, were pub. posthumously (1881). See life by Louise C. Moulton, 1891.

Oshawa, industrial city of Ontario, Canada, on Lake Ontario, 30 m. E. of Toronto. It has a good harbour, and is on the main lines of both the Canadian National and Canadian Pacific railways from Toronto to Montreal. It is the centre of a good agric. dist. The city has a fine collegiate-vocational institute, a modern hospital, a good public library, thirty-one churches, and four parks. Its hydro-electric power is provincially owned and municipally operated. The most important industry is motor-car and truck manufacturing; other industries include motor accessories, castings, brass and copper fittings, plastics, pharmaceuticals, builders' supplies, sheet-metal materials, woollens, pottery, and glass bottles. Pop. 30,000.

Oshima, group of three small is. belonging to Japan, lying S. of Kushin, in 30° 50' N. lat. and 130° E. long. Their names are Kuroshima, Iwoshima, and Takashima.

Oshkosh, city and co. seat of Winnebago co., Wisconsin, U.S.A., stands on both banks of the Fox R., near its mouth, 78 m. N.N.W. of Milwaukee, originally called Athens. Its prin. trade is in lumber and the various industries connected therewith; it also has engineering works for the manuf. of motors, boilers, etc. The city has a handsome frontage along the shores of Lake Winnebago, where many fine public edifices have been erected. Pop. 39,000.

Osiander, Andreas (1498-1552), Ger. Protestant divine, b. at Gunzenhausen. was son of a blacksmith whose name was Hoseman. He took an active part in the Reformation, and attended conferences at Marburg, Augsburg, and Schmalkald. While pastor in Nuremberg he pub. his famous *Harmony of the Gospels* (1537). In 1548 he was appointed lecturer at the newly founded univ. of Konigsberg, but his religious opinions were unpopular, and he was attacked by Melancthon and other Lutheran divines. O. became the founder of a famous family; his son Lukas (1534-1601), a court preacher; Andreas (1562-1617), son of Lukas, chancellor at Tubingen; Johann Adam (1626-97), preacher and prof. and chancellor at Tubingen; and his sons, O. and John, famous physician and philologist respectively. See life by W. Moller, 1870.

Osiers, trees or shrubs of the willow genus (*Salix*), cultivated for conversion into basket-making and other wicker-work. They are grown in plantations known as holls, and the produce is commercially called rods. O. are usually grown on deep rich alluvial soil, which is subject to flooding. Sets of two years' growth, about 18 in. long, are planted in Feb. or March at the rate of about 20,000 per ac. The land needs careful clearing for the first two years, and the holls must be replanted three years, lasting, if properly managed, fifteen years. *S. viminalis* is the common osier, with forty varieties or hybrids. This is the species chiefly used in basket-making. Brit. osier-beds also contain *S. triandra*, the Fr. willow, much hybridised; *S. purpurea*—which does not attain the tree form, its slender twigs being grown as O. by pollarding the trunk; and the golden osier, a variety of white willow.

Osimio (anct. Auximum), tn. in the Marches, central Italy, 9 m. S. of Ancona. It contains a cathedral, and ruins of the anct. walls, being a Rom. colony from 157 B.C. It has trade in grain and silk. Pop. 22,900.

Osiris, one of the chief gods of the anct. Egyptians. He was the son of Sob, the Earth, and Nut, the Heaven, and the husband of his sister Isis. After enduring much tribulation he was slain by Seth, but rose again, and finally became judge of the dead in the lower regions. The myth has been interpreted to signify the setting and rising of the sun as well as the ebb and flow of the Nile. The worship of O. spread to

Greece and Rome, and the Egyptian deity was identified with Dionysus. See J. E. Harrison, *Prolegomena to the Study of Greek Religion*, 1908; A. Wiedemann, *Die Religion der Alten Ägypten*, 1890; and H. Kees, *Der Götterglaube im alten Ägypten*, 1941.

Osjek, see **OSJEK**.

Oskaloosa, tn. and co. seat of Mahaska co., Iowa, U.S.A., 62 m. S.E. of Des Moines, between the Skunk and Des Moines Rs. It has coal mines and foundries, and manufs. clothing, tiles, boilers, and wagons. Pop. 10,000.

Ossler, Sir William (1849-1919), Eng. physician and humanist scholar, b. at Bond Head, Ontario, Canada. A wanderer by nature, he held his first chair of medicine at McGill Univ. 1874-81; he then became prof. of clinical medicine at the univ. of Pennsylvania, 1884-89; and at the age of forty he accepted the chair of medicine at Johns Hopkins Univ. in Baltimore, 1889-1904. Appointed Gulstonian lecturer at the Royal College of Physicians, London, in 1889, at the age of fifty-six he became regius prof. of medicine at Oxford. A versatile man, O. left the impress of an original mind on pathology, clinical and scientific medicine, and epidemiology. His famous *Principles and Practice of Medicine* (10th ed., 1917), was the most popular text-book in the Eng. language with sev. generations of medical students and practitioners. In his teaching O. inaugurated what has since been accepted as the Osslerian method, which characterises the Brit. school to-day, that the student should concentrate on the patient, using books and lectures merely as tools. Among O.'s most original and lasting contributions to scientific medicine must be included his investigations of the blood-platelets, his researches on the malarial parasite, his studies in malignant endocarditis, and his writings on angina pectoris and allied disorders. Tuberculosis was also one of his special subjects and he was one of the first to give tuberculin a thorough clinical trial. Under his guidance Oxford became the pioneer of the tuberculosis dispensary system in rural areas, and O. spent much of his time and talents in arousing public consciousness to the menace of this disease. He was one of the first seriously to question the establishment of alcohol in medical practice, and to point out that its regular use increased the danger of tuberculosis. O. was more than a great physician and scientist; he was a humanist and classical scholar, being the first member of his profession to be elected president of the Classical Association, and he was also made president of the Bibliographical Society in 1913. He was an enthusiastic collector of all Sir Thomas Browne's writings, which are included in the Bibliotheca Ossleriana, or library, which he bequeathed to McGill Univ. O. was an apostle of international medicine and personified the truth of the saying that art of healing knows no frontiers. Elected F.R.S. in 1898, he was created a baronet in 1911. Among his works are *Cerebral Palsies of Children* (1889); *Chorea and*

Choreiform Affections (1894); *The Principles and Practice of Medicine* (8th ed. 1912); *Lectures on Abdominal Tumours* (1895); *On Angina Pectoris and Allied States* (1897); *Monograph on Cancer of the Stomach* (1900); *Science and Immortality* (1904); *Aquanimity and other Addresses* (1904); *Counsels and Ideals* (1905); *An Alabama Student and other Biographical Essays* (1908); and *The Evolution of Modern Medicine* (1913). He also ed. *A System of Medicine*, in 7 vols. (1905-10). See F. G. Reid, *The Great Physician*, 1931.

Oslo (formerly Christiania), cap. city, and (with Aker) co. (*fylke*) of Norway, on the S.E. coast, at the head of the O. Fjord, on the Akershus peninsula, and on the bays on either side of the peninsula. The tn. extends W. to the R. Frognar, E. to the R. Løelv, and northwards up the valley of the Akerselv, and is very beautifully situated among pine woods and hills. The sheltered harbour is excellent, and has ample facilities to accommodate the largest ships. There is good anchorage throughout the harbour, the depths being 11 to 26 fathoms. During severe winters the fjord may be frozen, but is always kept open by ice-breakers. There are two railway stations with a good service of trains to all parts of Norway and into Sweden. Electric trains connect the city and the suburbs; the roads are good and the easy travelling has made O. a centre of extensive tourist traffic. The tn. has been well planned, full advantage being taken of the natural beauties of the site. A broad garden runs from E. to W. from the Storting to the foot of the hill on which stands the royal palace. The chief roads lead from either side of the central gardens. The tn. is nearly all modern, two of the oldest buildings being the Akershus fortress, now partly a prison, formerly a royal palace, and the Akers church, built in the eleventh century, but restored in 1860. Among the prin. public buildings are the Storting (Parliament) (1866), where the archives of the nation are kept; the univ., founded in 1811 by Frederick VI. of Denmark, which has 6000 students, a fine library containing 85 000 vols., a numismatic collection, and a splendid collection of Scandinavian antiquities; botanical gardens, and an observatory. The royal palace is a modern building completed in 1918. Our Saviour's church is in Stortorget off Karl Johansgate boulevard, close to Parliament House. N. of the univ. is the museum of art, containing a fine collection of ant. and modern painting and sculpture. The historical museum near to the art museum contains a good collection of Norwegian antiquities; at another museum are the remains of two Viking ships excavated in the neighbourhood from burial-places of Viking chiefs. One is the Gokstad ship on Bygdø Is. (ninth century) in good preservation and actually seaworthy. Frognerparken, one of sev. beautiful parks, contains the vast collection of works by the sculptor, Gustav Vigeland. Statues of Ibsen and Bjørnson stand in front of the National Theatre, close to Parliament House.

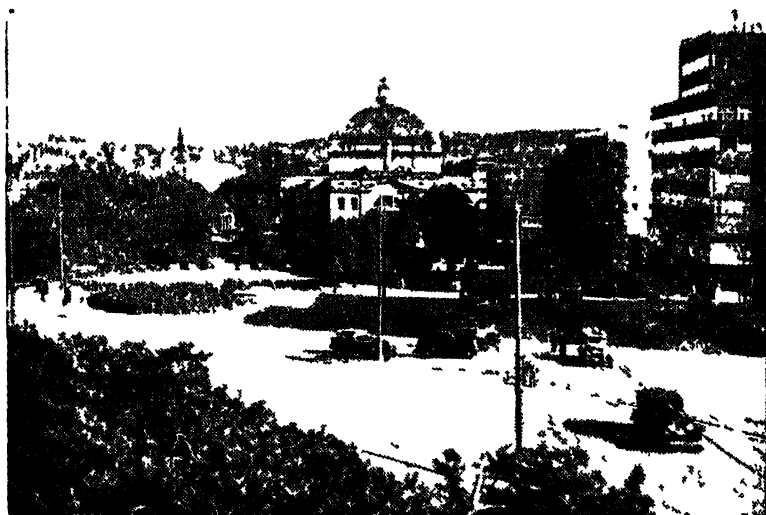
Formerly timber was the tn.'s prin.

industry, but the industry is less relatively important than it was, though there are still a dozen saw mills in and around the town, and six paper mills. O's industries are chiefly for domestic consumption, and are for the most part manuals of imported raw materials. Shipbuilding, textile, fancy goods, chemicals, machinery, treatment of metals, and timber and fish industries all figure in the economic life of O. The chief exports are wood, kilns, wood pulp, paper, boards, nails, condensed milk, cellulose, matches, cod liver oil, fish, and canned fish, mats, and car tires.

It was founded in 1917 by King Harold.

basis. It was amalgamated with the
a) from dist of Akci on Jan 1 1948
thus increasing the pop. of the co to
410 000 and increasing the area from the
of 11 167 sq km of the city to 162 4

The birches of O. are rapidly growing
 they contain some interesting buildings
 those of the old palace once episc-
 opal residence James VI of Scotland
 was built for Anne of Denmark in
 1591. The first of built in Slough
 in 1811. The new one is erected as
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OSLO IN THE CENTRE OF THE NATION IN ALL

Haardraude at the mouth of the Lofen R. and at the foot of Fjellvitz Hill. In 1641 it was completely burnt down and re-planned by Christian IV, who had it built on a more westerly site. Christians IV (hence the name Christiania) was virtually a new town built on a Romanesque plan and surrounded by walls and moat. It took eight years to build. In 1811 it became the seat of the new king of Norway; thereafter its growth was rapid: the population was 77,000 in 1877, 175,000 in 1894, and it was 253,900 (administrative district) before the extension of its boundaries in 1945. This rapid growth was due to railway construction in 1850, the industrial revolution with a consequent inflow of people from the surrounding districts. As Christiania it became the royal residence and capital in 1811 and this made the extension of the town and its public buildings necessary in order to facilitate the growth of the town on a planned

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Osb Convention f D 1430 was for a general measure of trade between these countries and the Netherlands before a treaty with Denmark and Luxembourg had been reached in 1933.

Osman, i. عثمان ibn 'Affān, third caliph of the Moslems b. about 574. He belonged to the family of the prophet, and

was cousin-german of Abu Sofian. One of the early converts to Islam, he was one of its most zealous supporters, and linked himself still more strongly to Mohammed by becoming his son-in-law and private secretary. He was elected to succeed Omar in the caliphate in Dec. 634, and a most unworthy successor he proved to be. The Moslem Empire, however, continued to extend itself on all sides till the insane nepotism of O. gave its progress a sudden check. O. averted the crisis of a general revolt by unconditional submission; but having soon after attempted to put to death Mohammed, the son of the Caliph Abu-basr, the latter made his appearance at Medina at the head of a troop of malcontents, and forcing his way to the presence of O., stabbed him to the heart.

Osman I., or **Othman**, **Othoman** (1259-1326), surnamed **Al-ghazi** (the conqueror), the founder of the Ottoman or Turkish Empire, was b. in Bithynia. His father, Orthogrul, the chief of a small tribe of Oghizian Turks, had entered the service of Ala-ed-din Kaikobad, the Seljuk sultan of Iconium, and had rendered important services to that monarch and his successors in their wars with the Byzantines and Mongols. Orthogrul dying in 1289, after a rule of more than half a century, his tribe chose his son O. (i.e. the 'young hussard'), as his successor. O. trod in his father's footsteps; and on the destruction of the sultanate of Iconium in 1299 by the Mongols, succeeded in obtaining possession of a portion of Bithynia. He had previously subjugated many of the neighbouring Oghizian chiefs, and this new accession of ter. rendered him powerful enough to attack the Byzantines with success. In July 1299 he forced the passes of Olympus, and took possession of the whole ter. of Nicaea, with the sole exception of the tn. of that name, which resisted his efforts for five years longer. In 1301 he defeated the Emperor Andronicus II. at Baphrion; in 1307 he incorporated the prov. of Marmara in his dominions; and continued till his death steadily to pursue his plans of conquest. He is worthily accounted the first founder of the Turks' great kingdom and empire. O. assumed the title of sultan on the extinction of the Iconium sultanate in 1299. From his name is derived the name **Osmanlis**, under which was comprehended all the Turkish subjects of the former sultans.

Osman II. (1605-22), sixteenth sultan of Turkey, son of Ahmed I. He succeeded to the throne in 1615 on his brother, Mustafa I., being declared incompetent, but he reigned for only four years. War with Persia having been brought to a close by a treaty in 1618, by which all the conquests of Murad III. and Mohammed III. were relinquished, the Janissaries, now unoccupied, began to plot against the sultan. O., finding a pretext in the revolt of the Moldavians who had joined the Poles, declared war against the king of Poland, and marched on Khotin. The Janissaries proved entirely untrustworthy, with the result that the expedition was unsuccessful. O. then planned to collect an army in

Arabia, but the Janissaries, being warned of his project, revolted, and O. was dethroned and put to death in 1622.

Osman III. (1696-1757), succeeded his brother Mahmud I. as sultan of Turkey in 1754, his reign of three years was not marked by any political event of importance.

Osmanli, see **OSMAN I.** or **OTHMAN**.

Osmanthus, genus of evergreen shrubs and trees (family Oleaceae). The flowers of *O. fragrans*, sometimes grown in green-houses, are used in China to scent tea. *O. ilicifolius* and *O. Delavayi* are very handsome hedge plants.

Osmiridium, or **Iridosmine**, alloy of osmium and iridium. It commonly occurs associated with platinum, palladium, copper, gold, and iron in the so-called platinum ores, found usually in outcrops of detritus deposits. The chief supplies of platinum ore are obtained from Russia, New Granada, Brazil, California, and Australia. Of these, the Australian deposits are richer in O. in proportion to the platinum, and deposits have been found in Tasmania, where the O. is associated with iron. O. is used as a source of the two metals osmium (q.v.) and iridium (q.v.).

Osmium, metallic chemical element, symbol Os, atomic number 76, atomic weight 190.8. It occurs associated with iridium in the alloy osmiridium, which is found in platinum ores in the following proportions: Russian ores, 4.1 per cent; Australian ores, 27.1 per cent; Californian ores, 9.6 per cent. The platinum ore is first treated with aqua regia, the osmiridium being left as an insoluble residue. This alloy is then fused with common salt in a current of chlorine, the iridium being converted into OsO_4 , O. tetroxide. Metallic O. is obtained by the addition of an alkaline formate. O. is a grey metal of sp. gr. 22.5; it fuses at about 2500° C. It forms a protoxide OsO , a sesquioxide Os_2O_3 , a dioxide OsO_2 , a tetroxide OsO_4 , etc. It forms well-defined alkaline salts called osmates, red or green in colour. When heated in a current of chlorine, the metal forms O. dichloride, $OsCl_2$. O. is used as a catalyst, and the tetroxide is largely used in the preparation of specimens for microscopic examination.

Osmosis, percolation and intermixture of fluids separated by a porous membrane, first studied by the Abbé Nollet, 1718. He found that if a solution of cane-sugar contained in a vessel the bottom end of which was closed with an animal membrane (e.g. parchment) and placed in pure water, the latter entered into the cane-sugar solution, thus raising the level in the inside vessel until the hydrostatic pressure resulting was equal to the force tending to make the water enter. This force is known as osmotic pressure. A membrane which will allow simple water molecules to pass but which does not allow solute molecules to go through is known as a semi-permeable membrane. Quantitative work was done by Pfeffer using special semi-permeable membranes such as copper ferrocyanide precipitated inside

the walls of a clay vessel. Valuable work has also been done by the earl of Berkeley, Hartley, and many others. The actual selective flow of material through a membrane is called *O*. It was shown by van't Hoff that the laws of osmotic pressure are similar to those relating to gas pressure. The osmotic pressure of a solution varies directly with the concentration, temp. being constant, and also, for a definite concentration, is proportional to the absolute temp., if the volume is constant. This corresponds with the laws of Boyle and Charles for gaseous pressures. Then, again, equimolecular quantities of substances when dissolved in the same volume of solvent exert equal pressures at the same temp., i.e. they are said to be isotonic. It may be said that ideally the molecular weight in grammes of a non-electrolyte when contained in 22.4 litres of water-solution at 0° C. exerts an osmotic pressure of one atmosphere. In actual practice such solutions would often be too concentrated to obey the laws exactly. This law is true only of non-electrolytes and corresponds with Avogadro's hypothesis applied to gases, which states that equimolecular quantities of gases at the same temp. exert equal pressures. The measurement of osmotic pressure furnishes a method of determining the molecular weights of non-volatile substances and of substances which decompose when vaporised. The method is rarely employed in practice, as the direct measurement of the osmotic pressure is difficult. In the case of electrolytes valuable information as to the degree of ionisation can be obtained by comparing the observed osmotic pressure with the theoretical value,

$$m = \frac{n}{i}$$

where *m* is the 'degree of ionisation,' *n* is the number of ions given by 1 molecule of the electrolyte (e.g. for NaCl, *n* = 2, Na⁺ and Cl⁻) and *i* is the ratio of observed to calculated osmotic pressure. The phenomenon of *O*. is constantly taking place in living bodies, both animal and vegetable. Sap is caused to rise against the action of gravity in trees and plants, and the action of drugs in causing a flow of water through a membrane is probably due to *O*.

Osmund, St. (*d.* 1099), Eng. saint. As a chaplain he accompanied his uncle, William the Conqueror, to England, and in 1072 became chancellor. In 1077 he was made bishop of Salisbury (Old Sarum), where he completed the cathedral and estab. a chapter of secular canons. He is particularly remembered as the compiler of the liturgical services for his diocese, now known as the Sarum Use (*q.v.*). He engaged in the preparation of Domesday Book, and, as a hobby, practised bookbinding. He was canonised in 1457.

Osmunda, or **Flowering Ferns**, genus of very handsome ferns, so called because the brown sporangia are borne in branched masses at the tips of the huge fronds where the leafy portion disappears. The fronds are twice or thrice divided into pinnae, and sometimes attain a length of 6 ft. or more. There are a number of species; the only

Brit. one, *O. regalis*, the royal fern, is one of the most handsome. *O.* root fibre, which is now largely used in the cultivation of orchids, is mainly obtained from *O. claytoniana*, a native of N. America.

Osnabrück, city of lower Saxony, Germany, lies in the fruitful valley of the Hase, 80 m. W.S.W. of Hanover by railway. *O.* has iron and steel works and manufs. of cigars and tobacco, musical instruments, textiles, machinery, and many other industries. *O.* was raised to a bi-hopric in 783 by Charlemagne. The peace of Westphalia was signed here in 1648. The cathedral is a fine specimen of the Byzantine style of architecture of the twelfth century. The church of St. Mary, a noble Gothic building, was erected by the bishops of *O.* in the fourteenth century; it was completely burnt out by air raids in the second World War, when the city suffered heavily, the cathedral losing its roof and the tops of its towers.

O. was first bombed by the R.A.F. in July 1941, and frequently thereafter. It was important to hasten the capture of *O.* in the Allies' 1915 campaign because it was by the railway from that town that the Germans were able to carry V2 weapons into Holland, and it was the only railway by which they could do so. On April 2, following the crossing of the Rhine by the Twenty-first Army Group, a Brit. airborne force crossed the Dortmund-Ems Canal, and approached *O.*, while the Canadians pushed 15 m. into Holland; on April 4 Brit. armoured spear-heads crossed the Weser N.E. of *O.*, and next day *O.* was taken by the Brit. first commando brigade. Pop. 98,700.

Osoño, tn. of Chile, cap. of the dept. of *O.*, on the State Railways 590 m. S. of Santiago. The city, which is a distributing centre of an important agr. region, was founded in 1558 and soon developed into one of the chief tns. of the country. Some of its streets still preserve much of their colonial character, but modernism is the dominant note to-day. The Instituto Aleman, indicative of the Ger. character of the city, is an instance of the prevailing concrete construction. Pop. 62,000.

Osprey, **Fish Hawk**, **Fishing Eagle**, or **Bald Buzzard** (*Pandion haliaetus*), cosmopolitan bird of prey which feeds on fish, and is the only member of its genus. Its length is about 2 ft. and its wing expands nearly 6 ft. The plumage is dark brown on the upper surface and white on the under parts. The head and throat are white with streaks of light and dark brown. *O.s.* are somewhat gregarious in habit, and the nest is often made in trees near the seashore or lakes, &c. In it are laid two or three white eggs, blotched with crimson. The *O.* is practically extinct in Britain.

Ossa, or **Kissavos**, mt. in N. Thessaly, Greece, E. of the P. Pelion. Mt. Olympus is opposite, and between them is the vale of Tempe, famous in old traditions as the haunt of the Centaurs and Titans. It is 6405 ft. high. See also PELION.

'Osservatore Romano' (It. for 'Roman

Observer'), daily evening paper issued from the Vatican state. It was founded in 1860 by a group of Its. who had no official connection with the Vatican, but was acquired by the Church during the pontificate of Leo XIII. It is a semi-official organ (unlike the *Acta Apostolicae Sedis*), but one column of it is supplied from official sources. It is generally held to reflect the policy of the Vatican, and at times the popes have referred to its columns. Its circulation suffered heavily when engaged in dispute with the Fascists, who rendered its sale practically impossible, but since then it has returned to normal.

Ossetia, areas of Russia, in the mid-Caucasus. They are inhabited principally by the Aryan race known as Ossetes, descendants of the Alans, with an Iranian speech. N. O. lies N. of the Caucasus Mts., and is an autonomous S.S.R. S. O. lies immediately S. of it across the range, and is an autonomous region of the Georgian S.S.R.

Ossett, tn. in W. Riding of York-shire, 2½ m. W. of Wakefield. It has coal-mines, engineering works, and cloth mills, and is the centre of an area engaged in the preparation of artificial wool, mungo, merino, etc. At S. O. there are mineral springs. Pop. 14,400.

Ossewa Brandwag, or Ox-wagon Sentinel, organisation formed by certain elements of the Afrikaans-speaking people of S. Africa, with the avowed purpose of maintaining Afrikaans as a language and Afrikaans culture. It derived some influence from the inspiration that impelled the Voortrekkers northward when the Brit. Parliament of that day decreed freedom for slave in Cape Colony. Many of its original founders and members genuinely believed that Afrikaans culture might disappear unless kept alive among the Afrikaans-speaking people, but, like many analogous organisations, they soon assumed a political character and developed into republican extremists. Thus the old Broederbond became an association aiming at an anti-Eng. despotism and, later, identified themselves with the Nationalist political opposition led by Dr. Malan against the Hertzog Gov. After 1935 the Broederbond sank into obscurity and the O. B. emerged to take its place as a body running a secret coterie, whose real purpose was to establish a dictatorship on the Nazi model. It adopted the Nazi technique and the Nazi uniform, and its badge was the Ger. eagle combined with the swastika. It accumulated Brennings, rifles, and ammunition and made no secret of its intention to attempt a *coup d'état* if the opportunity came. It received the open support of Dr. Malan and, by 1941, claimed to have a membership of 250,000 among the 2,000,000 white inhab. of S. Africa. Other similar organisations were the Handlvaardersbond or Hand-tanners' League, and the Boerevolk, neither of any great influence. Its influence, however, declined sharply during the Second World War.

Ossian (Pawu), latinised form of the Gaelic Uislin, the name of a semi-mythical

Gaelic bard who is claimed by both Scotland and Ireland, and the presumed author of a number of narrative poems of high excellence, dealing with the deeds of Finn MacCumbhal and Cuchulain. About the middle of the eighteenth century James Macpherson (q.v.), a Scottish tutor, claimed to have discovered and transcribed these poems, which had existed in the Highlands from time immemorial in oral tradition. He embellished them somewhat in the process of trans., but the fact that they were afterwards taken down from the recital of many aged persons in the Highlands thoroughly disposed of the adverse criticism of Dr. Johnson, who saw in Macpherson's performance nothing but a pure invention. See T. W. Rolleston, *Myths and Legends of the Celtic Race*, 1911, and G. F. Black, *Macpherson's Ossian and the Ossianic Controversy*, 1926.

Ossietsky, Carl von (1889-1938), Ger. pacifist and journalist b. in Hamburg. He served in the regular army in the First World War and afterwards went to Berlin in the hope of founding a popular front against war. He was on the staff of the Berlin *Volkzeitung* and later (1928) editor of *Die Weltbühne*, a vehicle of advanced pacifist opinion. In 1929 one of his contributors accused the Reichswehr of secretly rearming in defiance of the Versailles Treaty and O. with his contributor, was sentenced to eighteen months' imprisonment. Meanwhile another article, by an anonymous contributor, developed the familiar thesis that all soldiers were murderers; O. was charged with insulting the army but was acquitted. In 1931-32 he was imprisoned on an alleged charge that he had revealed military secrets, and of being an enemy to the state (1933-36). While in prison in a concentration camp he was awarded the Nobel prize for peace for 1935 and should have received the sum of 100,000 marks, but it was never accurately learned how much he actually received, his lawyer being convicted of embezzling 83,500 marks of the prize money entrusted to him by O.'s wife. He died in a sanatorium for tuberculosis, which he had contracted through his maltreatment in the concentration camp at the hands of the Nazis.

Ossification, formation of bone. As a normal process it occurs in the development of the human body, and is particularly characteristic of the fetal and childhood periods. In general the structure is at first represented by cartilage, which is gradually transformed to the harder tissue known as bone. O. sometimes occurs as a morbid process, but more usually the term is incorrectly applied to calcareous deposits having the outward properties, but not the minute structure, of bone.

Ossining, tn. in Westchester co., New York, U.S.A., on the E. bank of the Hudson R., 31 m. N. of New York. It was known as Sing Sing till 1901. The chief manufactures are chemicals and machinery, and there are iron foundries. It contains the state prison of Sing Sing. Pop. 16,000.

Ossoli, see **PETER, SARAH MARGARET**.
Ossory, anc. kingdom of Ireland in the

Ostland, see **POLAND, History**.

Ostmark, name given to Austria by the Ger. Gov., after its incorporation into Germany in 1938.

Ostracism (Gk. *ostrakon*, a potsherd), democratic expedient exercised by the people of Athens, decreeing the banishment for ten, later five, years of any person who in any way whatever endangered the political equality of citizens. The Prytanes each year gave the opportunity in public assembly for the exercise of the right, each citizen writing the name of the person concerned on a potsherd or an earthen tablet, 6000 votes being necessary for sentence to be pronounced. It was introduced by Cleisthenes about 600 B.C. and abolished by Alcibiades, Miltiades, Themistocles, Cimon, Alcibiades, and other great citizens were ostracised. Civil rights and property were not thereby forfeited.

Ostracoda, order of minute crustacea belonging to the sub-class Entomostraca and being itself divided into four sub-orders, Podocopa, Mydocopoda, Cladocopa, and Platycopoda. An ostracod usually leaves the egg as a nauplius, is of low and simple form, and uses only three or fewer appendages in navigation. The Cypris, belonging to the family Cypridae, is a common type of ostracod, having a bivalve enveloping shell resembling a mollusc, a body without segments, and seven pairs of appendages.

Ostrava: 1. Moravská O. (Moravian O.; in Austrian, Mährisch-Ostrau, tn. on the Ostrawitz, 19 m. E.S.E. of Troppau, in Czechoslovakia, formerly in Austria. It has a mining academy, and owing to its position on an important coalfield has iron works, coke ovens, blast furnaces, and boiler, brick, soap, and petroleum factories. Soviet troops stormed O. on April 30, 1945. For its great strategic importance as the classic military gateway from Vienna to Poland see under **EASTERN FRONT IN SECOND WORLD WAR** in the account of the Russian invasion of Austria in 1945. Pop. 180,000. 2. Ślązská O. (Silesian O.), tn. in Silesia near Moravská O. Pop. 22,000.

Ostrich (*Struthio*), largest living bird, a native of Africa; but the name is sometimes given to the emu, a native of America. It has long been valued for its plumes, and the production of O. feathers is still a fairly important farming activity in S. Africa. For many years the birds were hunted and shot before their plumes were removed, and it is only comparatively recently that O.s. have been domesticated. Young birds were first enclosed in S. Africa in 1857; yet in 1865 only eighty were in captivity. After 1870 greater attention was given to their domestication, and the possibility of their extinction, which was then threatening, is now more or less remote. A flock under modern systems of O. farming is given the free run of about 1000 ac. of veldt, where the birds pick up a good deal of rough food. In addition, lucerne or some other similar crop is grown at the rate of about 1 ac. for three birds. The birds usually pair in May or June, and a pair of birds

breeds as often as three times a year; the hen lays an egg every other day, a sitting numbering from twelve to twenty eggs; and if they are removed, as many as 120 may be laid in the course of a year, whereas only half that number could be expected if the eggs were left to be hatched naturally. Other advantages of artificial incubation are that the eggs can be tested at the end of ten days, and, if found to be infertile, can be used, whilst still fresh, in the kitchen or sold to manufacturers of sweetmeats. The chickens hatch out at the end of six weeks, and for the first 50 or 60 hrs. are given no food, but allowed to bask in the sun. Afterwards they are put in charge of a native child, under whom they become very tame. In the first six months their growth is very rapid. At six months the chick feathers are removed by clipping, and two months later the dead quills are pulled out. At eighteen months they are full-grown, though not fit to breed till twice that age. Usually it is the three rows of feathers at the tips of the wings and the tail feathers that are taken, the quill being cut about 2 in. from the socket. The quill stubs are removed two months later to allow a new crop of feathers to appear. An exceptionally good bird should yield from 20 to 26 oz. of feathers, and should give about sixty long whites and from sixty to seventy long blacks, in addition to the body feathers. Birds may be plucked thrice in two years, but once a year is a fair average. The cock should yield one-third more than the hen. The S. African industry has shown great fluctuations. The price of feathers was highest just before the First World War, but later fell so low that O. breeding for profit was threatened with extinction. Since 1882 O.s. have been bred in S. Africa from carefully selected strains, but for many years no increase in the number of plumes has resulted. The boom in O.s. began in 1880, when £200 for a pair of birds was a common price. Particularly fine birds would fetch as much as £1000. Six years later the prices fell, and many farmers were ruined. The result was that output was reduced, and prices then recovered. In 1912 prices were good, but 1913 saw another heavy fall in the price of feathers. Probably no S. African industry suffered more from the outbreak of hostilities, the export trade being large. Drought and the change of fashion have reduced the number of birds in the union to a tenth of their former number. In 1913 there were 776,113 O.s. on European-owned O. farms, but the latest census (1937) shows only 40,265. Immediately after the First World War prices rose rapidly, but the volume of trade was not maintained, and to-day the industry appears to have fallen to lower depths than ever. In 1939 the value of O. feathers exported was recorded as £32,976 (in 1914 it was £1,342,717), and in 1940 it fell to £16,945. There is a fine of £100 for exporting O.s. and of £5 for exporting eggs for incubating from S. Africa. It may be noted that the Chartered Company at one time enclosed some 10,000 ac. on the Shangani R. for O. camps, but the

experiment was discontinued. Experiments in the tanning of O. skins have met with such success that the O. is disappearing from many dists. in the union.

Ostrich, South American, *see* *ITIRA*.

Ostroda (Ger. *Osterode*), tn. of Poland in the former E. Prussia, on Lake Dzwenz, 39 m. S.E. of Elblag (Elbing). There is a castle of the Teutonic knights dating from 1270, and iron-works. Pop. (1939) 19,300.

Ostrog, tn. in the Volhynia region of the Ukrainian S.S.R., 120 m. N.E. of Lvov, on the R. Goryn. There are oil-works and potteries, tanning, and manufs. of tobacco, candles, and soap. In 1581 was issued here the first complete trans. of the Bible in old Slavonic. Pop. about 13,000.

Ostrogths, *see under* *GOTHs*.

Ostrowskia magnifica, hardy perennial plant (family Campanulaceae), a native of the Bokhara Mts. It sometimes exceeds 7 ft. in height and bears huge campanulate blooms, lilac, blue, or pure white. It needs protection in winter.

Ostuni, tn. in the prov. of Lecce, Italy, 19 m. W.N.W. of Brindisi. It is the seat of a bishop, and contains a cathedral. Pop. 30,600.

Oswald, *Wm.* (1853-1932), Ger. chemist, b. at Riga in Latvia. In 1887 he was appointed to the chair of chem. at Leipzig Univ., but retired from this position in 1906. He also held the position of director of the Electro-chemical Institute of Leipzig in 1898, and was the first exchange prof. at Harvard Univ. in 1905. In 1909 he was awarded the Nobel prize for chem. His process of forming nitrogen oxides by the oxidation of ammonia enabled Ger. manufs. of explosives in the First World War to be maintained despite the loss of Chilean nitrate imports. His numerous works embrace general chem., principles of natural science, energy, electro-chem., and monism; and works on Comte, Schopenhauer, etc. His autobiography, *Lebenslinien, eine Selbstbiographie*, was pub. 1926-27.

His son, Wolfgang, was b. 1883 in Riga, and from 1922 held the first chair of colloidal chem. at Leipzig, and became a leading authority on this subject.

Ostyaks, *Ostiaks*, or *Keti*, people of Finnish stock of N.W. Siberia. They are scattered in isolated groups along the Ob basin northwards to the estuary, and eastwards to the Yenisei between Yeniseisk and Turukhansk. They are gradually dying out, and though they are spread over an area of 400,000 sq. m. number only about 18,000. Their national organization is completely broken up, and they have almost ceased to dwell in settled abodes since the destruction of their vils, and strongholds by the early Russian invaders of W. Siberia. They are a very primitive people, and are still in great part heathens, living on raw flesh in dirty huts, and using weapons of bone and stone. They also employ bows and arrows, and subsist by fishing and hunting fur-bearing animals. In religion they are Shamanists, and nowhere else does the wizard or medicine-man enjoy more influence than

among the O. Their language belongs to the Finnish div.

Osuna (anct. *Urso*), tn. of Seville prov., S. Spain, 50 m. E.S.E. of Seville. Corn, esparto grass, oil, olives, wine, and fruit are produced. Pop. 18,000.

Oswald, *Saint* (c. 605-642), king of Northumbria (634-642), and son of Ethelfrith of Bernicia. He defeated the Welsh king, Cadwalla, at Heavenfield (identified with St. Oswald's Cocklaw, near Chollerford, Northumberland) and thus fought his way to the throne. He had previously become a convert to the Christian faith at Iona, and by the help of St. Aidan, on becoming king of Northumbria, estab. Christianity throughout the kingdom, founding the Lindisfarne bishopric. His festival is celebrated on Aug. 5. To commemorate his victory over Cadwalla, O. raised the first cross over the Christian altar in Bernicia. He was defeated in battle and slain by Penda, at a place then called Maserfield (probably Oswestry).

Oswald, *Saint* (d. 992), Eng. ecclesiastic and archbishop of York, said to be of Dan. parentage. He was brought up under the care of his uncle, St. Odo of Canterbury, who, at his request, sent him to the monastery of Fleury on the Loire to learn the rule of St. Benedict, which, on his return to England, he taught to his fellow countrymen. He was associated with St. Dunstan and St. Ethelwold in the revival of eccles. discipline and monastic life in England, himself founding the abbey of Ramsey, and the monastery at Worcester, which later became the cathedral priory. He was made bishop of Worcester in 961, and archbishop of York in 972.

Oswaldwistle, urb. dist. and tn. of E. Lancashire, England, 3 m. E.S.E. of Blackburn. It has cotton mills, collieries, stone quarries, and chemical works. Paper and pottery are manufactured. Sir R. Peel was born (1750) at Peelford in the township. Pop. 12,800.

Oswego, city and cap. of O. co., New York, U.S.A., on the S.E. shore of Lake Ontario and 35 m. N.W. of Syracuse. It has a good harbour and large shipments of grain, lumber, and coal. There are sev. iron foundries, machine shops, and oil works, and the manufs. include matches, engines, hosiery, starch, flour, textiles, etc. It is of historic interest because of its importance in Fr. and Indian wars. Pop. 22,000.

Oswego Tea, name applied to sev. species of *Monarda* plants, natives of N. America, by reason of the infused dried leaves being occasionally used as a beverage, given as a stomachic or in intermittent fevers. They are of the family Labiate, similar to mint in appearance. The particular species are the *M. purpurea*, *M. didyma*, and *M. Kalmiana*.

Oswell, *William Cotton* (1818-93), Eng. explorer, b. at Leytonstone. He obtained an appointment in the East India Company, and in India became an enthusiastic hunter of big game. Sent to S. Africa to recover his health, at Kuruman he was the guest of the famous missionary, Moffat, and his wife. In 1846, together with two

Indian officers he explored the Limpopo. Here he met with the *kuibaboa* or straight horned rhinoceros, which he believed to be a separate species of the white rhinoceros. After another year in India O returned to the Cape (1818) and joined the Livingstones at Kolobeng (1819). With Livingstone and Mungo Murray he took part in the discovery of Lake Ngami and in the exploration of the Kalihail desert. His notable expedition by traversing routes previously impassable to Europeans succeeded in connecting the

indeed the earliest story of the expedition was learned through letters from Livingstone. See also by his son W. Edward O., 1900.

Oswestry, tn. of Shropshire, England 20 m. N.W. of Shrewsbury. The trade is chiefly zinc, tinning, insulated equipments and printing in there are railway workshops. It has Wednesday markets. There is an infant grammar school founded in 1407 and the church originally belonged to a monastery founded in memory of Oswald, said to have been slain



High Commissioner for New Zealand

ONIA TAO LAKE WAIAHI
The the great lake of the world

pastoral lands from which great numbers had been hunted with the axes and the spears of the Maori. If he found the sand in the morning and sun very hot, he described the scenery along the Zouga the first of New Zealand as an incident with but only 75 ft in circumference. For his part in this expedition O received a medal from the Paris Geographical Society and the Kalihail rhinoceros was named after him. He also took part in the discovery of the Zouga, which the party first came upon in Schuur's country where it was called the *Schuur* (discovered Aug. 4, 1814). But notwithstanding O's services to geography and the loyal attitude of Livingstone towards him his work soon passed into oblivion the cause of this being his invincible laziness as a writer,

hereafter O was the original seat of the family of Fitz Alan from whom descended the earls of Arundel and the Stuart kings. (Cp. 11, 90). See W. Carter *History of Oswestry* 1833.

Oswiecim, tn. of Polish Silesia 33 m. W. by S. of Cracow. See AUSCHWITZ CONCENTRATION CAMP.

Oxymandias, see PAMISIA II.
Oxys, genus of Teychen shrubs (family Santalaceae). *O. alba* the principal species. Leaves numerous of small white flowers, followed by red berries. It is a native of S. Europe and is half hardy in Britain.

Otago, prov. dist. of New Zealand S.W. situated to the S. of the prov. dists. Canterbury and Westland. It was one of the six original dists. of the colony which since 1876 have been abolished and the co-

system adopted. It is divided into two areas: O. Portion and Southland Portion. The mts. run from N.W. to S.E., the chief ranges being the Barrier Mts., the Kakanui Range, the Crown Mts., the Hector Mts., Richardson Mts., Kyre Mts., Aika Mts., Livingstone Mts., and Takikimu Mts. The chief rivs. occur on the E. coast, those on the W. being short torrential streams, and of the former the Clutha, which discharges the drainage from lakes Hawea, Wanaka, and Wakatipu, has the largest volume of any riv. in New Zealand. The Mataura drains the country to the S. of Lake Waikare, and the Waiau R. discharges the waters of lakes Te Anau and Manapouri. The fjord-like lakes lie in long narrow valleys, and are famous for their fine scenery, and of these the chief are Wakatipu, with a depth of 1239 ft., and Lake Manapouri, 1462 ft. deep. Among industries may be mentioned the rearing of live-stock, arable agriculture, and mining, the prin. crops being wheat, oats, and barley, as well as all sorts of vegetables and fruits. In 1911 there were sixty-seven cheese factories and eight butter factories. In 1940-41 13,738 tons of cheese and 27 tons of butter were forwarded for export. O. has an important woollen-milling industry. Gold occurs in large quantities, and also coal, brown stone, and slates. The cap. is Dunedin, which is picturesquely situated on the S.W. side of O. harbour. It was founded in 1848 by members of the Free Church of Scotland, and owes its prosperity to the gold mining of O. It is the most important commercial centre in New Zealand and is the seat of one of the chief colleges in New Zealand Univ., and the prin. school of mines. Area (O. Portion) 14,050 sq. m.; (Southland) 11,170 sq. m. Pop. (O. Portion) 152,200; (Southland) 71,400; and about 400 Maoris in each.

Otaheite, see TAHITI.

Otaridja, see TARIHAL.

Otaru, seaport on the W. coast of Japan, off the is. of Yezo on Ishikari Bay, 90 m. N. of Hakodate. It has the most important fisheries of the is., and is especially a herring fishing centre. It manufs. agric. implements, vegetable oils, spirits, etc. Pop. 154,000.

Otavallo, bn. of Ecuador, S. America, on the railway between Quito and Ibarra, 90 m. from Quito and 16 m. from Ibarra. It is the centre of an agric. dist. Its industries include wool, carpets, and ponchos. Pop. 15,000.

Otavi, mining centre of S.W. Africa, in Namaqualand. Deposits of lead and copper are worked at five centres in the dist.

Otea, see GREAT BARRIER ISLAND.

Oxford, vil. of Kent, England, 2½ m. N. of Sevenoaks. It has traces of a Rom. villa, and was the scene of battles fought by Offa of Mercia and Canute. There are extensive ruins of the palace built by Archbishop Warham in the early sixteenth century, and sev. Tudor houses in good preservation. Pop. 2000.

Otfried (c. 800-70), religious poet, b. in Alsace. Having studied in the abbeys of St. Gall and Fulda, where he had Rabanus

Maurus for his master, he joined the Benedictine monks and entered the monastery at Weissenburg. He wrote *Liber Evangeliorum*, a political harmony of the gospels in Old High Ger., printed at Basle in 1571. See study by D. A. McKenzie, 1946.

Othere, Othhere, or Ottar, 'the old sea-captain who came from Helieland,' Norse navigator and explorer of King Alfred the Great's reign. He made two voyages between 880 and 900, in one of which he sailed round the N. Cape into the White Sea. See King Alfred's trans. of Orosius (Sweet's ed., 1883).

Othmar, St. (Othmar, Audemar) (d. 759), was of Teutonic origin. In 720 he became abbot of the dilapidated monastery of St. Gall. There he introduced the Benedictine rule, and made St. Gall the most important abbey of Switzerland. He died in prison after an unjust condemnation, by an eccles. tribunal, after persecution by two neighbouring counts.

Otho I., or Otto the Great (912-73), Holy Rom. Emperor, son of Henry the Fowler, at whose death in 936 he was crowned king of the Gers. at Aix-la-Chapelle. He stopped the progress westward of the Huns and Wends, made Bohemia and Bavaria his tribes, and estab. a feudal system, subject to himself, throughout central Europe. In 916 he attempted to release Louis of France, who had previously assisted his rebellious barons, from the captivity in which he was held by Count Hugh, and in 941 defeated Boleslas of Bohemia. Adelaide of Italy was besieged in Canosa by Berenger II., and after crossing the Alps and releasing her, O. married her at Pavia. In 961 he again invaded Italy, and was crowned emperor of the W. by Pope John XII., whom he later deposed in favour of Leo VIII. See K. Hampe, *Otto der Grosse*, 1923; J. Haller, *Das alt-deutsches Kaiserium* (6th ed.), 1924; R. Holtzman, *Kaiser Otto*, 1936; and M. Lintzel, *Die Kaiserpolitik Ottos*, 1943.

Otho II., or Rufus (955-83), Holy Rom. Emperor, son of Otho I. and Anelaide of Italy. On the death of his father in 973 he was forced to contest the crown with his cousin, Henry of Bavaria, whom he defeated and sent into exile. He then went into France on an expedition against Lothair, and succeeded in laying waste Champagne, but was defeated at the Aisne. He was next called to Rome by a rising of the citizens, whom he treated with great cruelty. In 982 he was defeated in an engagement with the Gks. and Saracens at Basentello, in Apulia, by the treachery of the Beneventans.

Otho III., or Otto (980-1002), Holy Rom. Emperor, son of Otho II. and Theophanu, daughter of the Gk. emperor. He succeeded to the throne as a child, and during his minority great power was obtained by the Rom. consul, Crescentius. In 996 O. non. 'ated Gregory V., a relative of his own, as pope, but the nomination was rejected by the consul. In return for this O. marched to Rome and succeeded in dragging Crescentius from the castle of Sant' Angelo and bringing about his

execution. There is a story that the widow of Crescentius gained an influence over O., and then, in revenge for the murder of her husband, poisoned the young emperor by means of either a poisoned glove or a potion. See O. E. Schramm, *Kaiser, Rom und Renovatio*, 1929.

Otho IV. (c. 1174-1218), Holy Rom. Emperor, son of Henry the Lion, duke of Bavaria, and Matilda of England. He spent some time at the court of Richard I. of England, and assisted him in his wars with Philip Augustus. In 1197, on the death of the Emperor Henry VI., O. became the Guelph candidate for the throne in opposition to Philip of Swabia, supported by the Ghibellines. After a long struggle it appeared that Philip was victorious, but he was assassinated in 1208 and O. was crowned emperor in 1209. He at once became involved in a conflict with Pope Innocent III., and after invading Naples in 1210 was called back to Germany by insurrection there. In 1214 he was utterly defeated at Bouvines by the pope's ally, Philip Augustus. See E. Winkelmann, *Philipp von Schwaben und Otto IV.*, 1872-78.

Otho, Marcus Salvius (c. A.D. 31-69), emperor of Rome. In 58 he was sent by Nero to govern Lusitania, in order to separate him from his wife, Loppaea Sabina, whom Nero afterwards married. In 68 he supported Galba's rebellion against Nero, and when Galba became emperor accompanied him to Rome. He expected to be nominated as Galba's successor, but Galba designated Piso for this, and O. stirred up a rebellion. Galba and Piso were killed, and O. was proclaimed emperor in 69 everywhere except in Germany. Here Vitellius had been proclaimed emperor, and he marched on Italy and defeated O., who then killed himself.

Otho, or Otto, of Freising (c. 1111-58), historian, son of Leopold, margrave of Austria. He was made bishop of Freising by his half-brother, Conrad III. His great work is a world hist., *Chronicon seu historia de duabus civitatibus*. In seven books, coming down to 1146, which was continued by Blasius to 1210. He also wrote a hist. of the Emperor Frederick I., and a treatise on the end of the world. See C. Mierow, *The Two Cities* (Eng. trans. of Hofmeister's ed. of the *Chronicon*), 1928.

Othonna, genus of trailing shrubs or herbaceous plants (family Compositae) with tuberous roots and yellow flowers. *O. crassifolia*, African ragwort, is a useful plant for hanging baskets or pots.

Othonnopsis, genus of shrubs (family Compositae) with decorative grey glaucous leaves and showy yellow flowers borne in late spring. *O. cheirifolia*, a native of N. Africa, is easily grown on a dry rocky or hot border, but needs protection in winter.

Othrys (*Ossa*), or Heliovo, lofty mt. range in S. Thessaly, Greece, now called Gura, shutting in the Thessalian plain on the S. It extends from Mt. Tymphrestus, a summit of the Pindus Range (S.), E. through Pithiotis to the coast, separating

the Peneus and the Spercheus. The summit Gerakiovouni is about 5670 ft. See Strabo, ix.; Herod., vii. 129.

Otiorrhynchus, genus of weevils or plant-eating beetles. Many cause great damage to cultivated crops, both in the larval and beetle states. They can be destroyed by spreading pieces of sacking near infested plants and collecting them during the daytime while they seek shelter.

Otis, James (1725-83), Amer. statesman, b. at Barnstable, Massachusetts. He was a prominent member of the Massachusetts House of Representatives, and is especially famous for his speech of 1761 in support of the liberty of the colonies with regard to taxation. He was one of the organisers of delegates to the Stamp Act Congress of 1765. He pub. in 1762 *Indication of the Conduct of the House of Representatives of the Province of Massachusetts Bay*, in which he defended the Assembly for its rebuke of the governor for calling upon it to pay for protection against Fr. privateers which it had not sought, and *Rights of the British Colonies Asserted and Proved* (1761), etc. See lives by W. Tudor, 1823; F. Bowen, 1847; and F. W. Sprague, *Birthplace of the Patriot James Otis*, 1917.

Ottis Media, see E.Mt.
Otley, tn. in the W. Riding of Yorkshire, England, 94 m. N.W. of Leeds, on the R. Wharfe. Near by is Farley Hall, where Turner painted many of his pictures, and where there is a fine private collection of his works. There is a seventeenth-century grammar school, and the seat of the Fairfax family is at Denton Park near by. O. has an agric. trade and manufs. of leather goods and machinery, and in the vicinity are woollen and worsted mills. Pop. 11,020.

Otocyon, see *Yoa*, *African Wild Dogs*.
Otoliths, or **Ear Stones**, are concretions, usually stony, which occur in the cranial cavity of fishes, and which are in contact with the ends of the acoustic nerves. Their function is as an organ of balance, and they vary greatly in size, but are commonly minute. In the cod they are as big as the thumb-nail, and resemble porcelain in colour and texture. Frequently they are the only parts of a fish's anatomy which survive decay, and their variation affords a clue in many cases to species. Corresponding concretions occur in many invertebrates.

Otomi, Indian tribe of the Mexican plateau. They are probably a people of immense antiquity, dating from before the Toltec invasion, and were driven S. and partially subdued by the Aztecs or Nahuas. At the time of the conquest of Mexico they inhabited the mountainous dist. W. of the Mexican lakes. They number about 280,000, and are scattered through Guimajuato, Hidalgo, Queretaro, and Mexico states.

Otranto (anc. *Hydruntum*), seaport and archiepiscopal see of Lecce prov., Italy, on the strait of O., 45 m. S.E. of Brindisi. It has an anc. cathedral and ruins of an old castle (see Horace Walpole's *Castle of Otranto*). In the Middle Ages the chief port of Italy whence passengers took ship for Greece, O. was taken by the Turks

(1180) O is a fishing centre and a sea-side resort. Building material and cereals are exported. Pop. 300.

Otsego, Hancock Co., New York, U.S.A.
60 m N.W. of Albany. It is 9 m long,
and 1 to 2 m wide, and is the source of the
Susquehanna R.

Otsu, tn. in the prov. of Ōru, Ii nshū Japan on Lake Biwa 9 n. S. of Kyoto It is the ancient capital of the province and seat of the and is famous for its annual festival (gion) Pop. 6000

Ottajano, in the province of Frosinone, Italy, at the foot of the M. Vesuvius. It has a castle built on a hill outside the town. Pop. 13,900.

Ottava Rima. It consists of stanzas of (hex)dec syllabic lines used for chivalric romance and in modern poetry. There are other dec syllabic octaves, and

that used by Chaucer in *The Monk's Tale* and later by Spenser with or without that adoption of the Alexandrine which converts it into the Spenserian stanza. The O.R. stanza with a heroic line rhythm alternately followed by a couplet or a triad (iamb) was introduced into England by Sir Thomas Wyatt who adopts the Petrarchan rhyming scheme *Illegitimi non sunt* in the second

by using the word *duce* in the title, to generally introduce the theme that the first of the allusive *periphrases* (*periphrase*) was used by him. It suffers from the same weakness as the first line, for it was especially effective in mock heroic verse (*mock heroic*) than in the other types of English Poetry (*English Poetry*) and other. It was actually used by Elizabethan poets (*Elizabethan poets*) like Philip Sidney (*Philip Sidney*) in the *Alcmade* on the 'triumph of Edward VI' (*triumph of Edward VI*) in rhyme and it was afterwards modelled on it by *Thomas*

too) but more out of a tradition than such
 as Edward Taylor or his imitators
 (L.S.) and in the last of the Haringtons
 in the 17th century. I was also revived
 by that but is in the nineteenth century
 (e.g. by Wm. Lisle, who in 181
 published *Amesbury* and the poem in
 O.R. full of the same old theme. Wm.

[illegible]

Ottawa 1) Episcopal city, port of entry and cap. of the Dominion of Canada in Ontario on the R. O. at its confluence with the Rideau 101 m. W. of Montreal

O is on both the Canadian National and Canadian Pacific main railway lines and lies 220 m N E of Toronto and 110 m W of Montreal. It is a handsome city, picturesquely situated on a cluster of hills overlooking the R. R. It is regularly laid out in rectangular blocks between the Chaudière and Rideau Falls and is divided into two parts by the Rideau Canal. Much money has been spent in recent years in improving its parks, drive way and general appearance. The chief building in the city is the Parliament Building (18-19 C) on Parliament Hill the Roman Catholic



At night, the candles
of the church were lighted
and the people gathered
to the service.

located at Notre Dame Christ Church (Catholic) Park in Hall the residence of the governor general in the suburb of New Edinburgh in the city. The Catholic group of the Province of Newfoundland dominates the city. The tall Peace Tower has a splendid cannon and a noble memorial hammer to the soldiers of the First World War. Old St. John's Catholic (c. 1810) normal school (primary teachers training college) technical school (collège) and the senior high school (collège) public school library and a splendid park system. Besides the two cathedrals there are over eighty churches scattered in the residential districts. Here is held the annual central Canada exhibition. The chief industry of the town is lumbering. Thousands of men spend the winter in cutting down the timber which is floated down to the searing floods.

The output of the O. lumber-mills is enormous. There are also manufs. of flour, iron goods, leather, and matches. The Chaudière Falls (200 ft. wide and 50 ft. high), on the O. R., between O. and Hull, supply splendid water power to drive the factories situated along the banks of the riv. Within 50 m. of O. are installed hydro-electric plants, to a capacity of 1,023,500 h.p. The city is the social and educational centre of Canada and contains many museums, galleries, and educational institutions. The site of O. was discovered in 1613 by Champlain, who named the riv. that joins the O. here the Rideau. The city's origins date back to 1826, when a tn. grew up around the headquarters of the Brit. army engineers who were building the Rideau Canal, which, with the chain of Rideau Lakes further S., affords navigation for small craft to Lake Ontario at Kingston, 90 m. S. The commanding officer of the engineers was Col. By, and the settlement was first called Bytown. The tn. was incorporated in 1854 and the name changed to Ottawa, after the great riv. on its N. side. In 1858 Queen Victoria chose it to be the cap. of Canada, at that time comprising only what are now the provs. of Quebec and Ontario. In 1867, on confederation, it was made the cap. of the dominion. It returns two members to the dominion House of Commons and three to the Ontario Legislature. Pop. 155,000, O. being the sixth city for size in Canada, following after Montreal, Toronto, Vancouver, Winnipeg, and Hamilton. 2. Co. seat of Franklin co., Kansas, U.S.A., on Osage R., 35 m. S.E. of Topeka. It has railroad machine works, and contains the O. Baptist Univ. Pop. 12,000. 3. Co. seat of La Salle co., Illinois, U.S.A., on Illinois R., 83 m. S.W. of Chicago. The Fox R., joining the Illinois just above O., provides water power for extensive and varied manufs. Coal is found in the neighbourhood, and there are valuable mineral springs. Pop. 15,000. 4. One of the largest rivs. of Canada, rises in lat. 48° 30' N., long. 76° W., on the watershed on the opposite side of which rise the St. Maurice and Saguenay. After a course of over 700 m. it falls into the St. Lawrence by two mouths, which form the Is. of Montreal, and its drainage area measures about 80,000 sq. m. During its course it widens into numerous lakes of considerable size, and is fed by many important tribs. The O. is connected with Lake Ontario at Kingston by the Rideau Canal. An immense lumber trade is done on the riv.

Ottawa, tribe of N. Amer. Indians, whose original home was on the upper O. R. In 1466 they were driven to the W. by the Iroquois, and early in the eighteenth century settled about the lower end of Lake Michigan. They now number under 5000, and are found mainly at the Mackinac Agency in Michigan, and on Monticulin Is., and Cockburn Is., Ontario. They belong to the Algonquin stock.

Ottawa Conference, imperial economic conference of the Brit. Commonwealth of Nations, held at Ottawa in July 1932. A series of trade agreements were concluded

between the United Kingdom Gov. and the govts. of the dominions, the general principle being to grant free entry for dominion imports into the United Kingdom market in consideration of preferences for United Kingdom exports into dominion markets. These agreements were for a period of five years ending July 1937, but were to continue unless either party gave six months' notice of termination. Discussions arose in 1933-1935 over the expanding Australian and New Zealand imports of frozen or/and chilled meat, but it was eventually arranged to regulate the supplies of frozen and chilled beef on a given basis, the actual allocation to be left to an Empire Meat Council. Difficulties also arose over the principle, incorporated in all the Ottawa agreements, of adjusting tariffs on Brit. secondary goods according to the relative cost of production as compared with similar manufs. in the dominions; in some cases the dominion govts. were really protecting secondary industries which economically were unsound, and it was found that appeals by United Kingdom groups to dominion tariff boards, even where successful, were ignored through doubts as to the official status of these boards, and as to whether their decisions were binding on the dominion gov. concerned or were merely advisory. In Feb. 1937 the United Kingdom and Canadian Govs. concluded a new trade agreement continuing for four years the principles of the agreement of 1932. The decisions which Brit. statesmen took at Ottawa influenced the economic prospects of most peoples, whether within the Brit. Empire or not. The O. C. tried to dovetail the new protectionist policy of Great Britain into the long-standing protectionist policies of the dominions. Great Britain and the dominions assumed reciprocal obligations, both of a general and a detailed character, to give preferential treatment to each other's commerce. Foreign critics suggested that the Ottawa treaties were a violation of Great Britain's international obligations and an unprovoked attack on the livelihood of innocent neighbours. The treaties were neither, and the conference was designed for mutual protection against the intolerable aggression of most other nations and was in fact demanded by the dominions; and, though some of the colonies, especially the rubber- and tea-producing colonies like Ceylon and Malaya, would have preferred the continuance of the free trade system, others, like the W. Indies and Mauritius, wanted a sheltered market for their basic products. Certainly the legal right of the Brit. Empire to co-ordinate its separate tariffs in a general structure of reciprocal preferences is incontestable, and criticism, generally, came ill from the politicians who framed the outrageous Hawley-Smoot tariff in the U.S.A. In fact the Ottawa experiment is already past history in the course of the immediately succeeding years agreements were made which considerably modified the treaties or agreements made as a result of the conference. It soon became evident that the

St. Mary is one of the finest in England. Its hist. may be traced back to 1061 and a Norman font has been discovered. In the fourteenth century Bishop Grandisson rebuilt much of the thirteenth-century structure, transforming it into a collegiate church, which status it held until the Reformation. The building bears striking similarities to Exeter cathedral, on which Grandisson also worked. The dist. contains good examples of Elizabethan architecture at Cadhay and Knightstone. Escot Grange was the 'Fair Oaks' of Thackeray's *Pendennis*. Coleridge was b. in O. St. M. The ann. carnival said to have originated in 1688, is held Oct. Nov. 5. Pop. 4000.

Otto, see **OTHO**.

Otto, Nicholas, see under GAS ENGINES.

Otto the Great, see **OTHO 1**.

Ottokar, see **OGER**.

Ottoman Bank, prin. foreign bank in Turkey. It was estab. in 1863 as the Imperial O. B. (an Anglo-Fr. institution) by imperial firman under a concession from the Turkish Gov. The original title was altered to O. B. in 1925. It has a branch in every important tn. of Turkey. The concession of the O. B., extended in Aug. 1925, by the Turkish Gov. for a further period of ten years, was prolonged (June 5, 1933) until March 1952. The chief offices are in Istanbul, London and Paris.

Ottoman Empire, see **TURKEY**.

Otto of Roses, see **ATTAR OF ROSES**.

Ottrelite, blackish- or greenish-grey mineral, occurring in shining oblong plates more or less hexagonal, in argillaceous schist. It resembles chloritoid and phyllite, and is probably monoclinal.

Ottumwa, coal-mining city of Iowa, U.S.A., cap. of Winnebago Co., is built on both banks of the Des Moines R., 25 m. S.S.E. of Oskaloosa. It has a large pork-packing industry. Pop. (1930) 23,000.

Otus, see **ATOD V**.

Otway, Thomas (1652-5) Eng. dramatist, b. at Trotton, Sussex, was educated at Winchester and Christ Church, Oxford, and afterwards went on the stage. He was unsuccessful as an actor, but utilised his theatrical experience in writing plays. His tragedy, *Alchibades*, was produced in 1675, with Mrs. Betterton and Mr. Barry in the cast. In quick succession appeared *Don Carlos* (1676); *Edis and Lucan* (a tragedy adapted from Racine, 1677); *The Cheats of Scapin* (a farce adapted from Molière, 1677) (these last two were acted on the same night and pub. soon afterwards in one vol.); and *Friendship in Fashion* (1678). He became famous with *The Orphan* (1680) and added to his reputation with *Love Preserved* (1682). His plays brought him but little money, and at the height of his fame he was almost destitute. It is not certain how he met his death, but the story goes that he died of starvation in an inn. His two best plays have considerable merit. See life and works ed. by T. Thornton, 1813.

Ötztal, valley, in the Austrian Tyrol, drained by the Ötz, which flows N. till it joins the Inn. It is very beautiful, sur-

rounded by the O. Alps, on which are the finest glaciers in Austria.

Ouachita, or **Washita**, riv. rising in W. Arkansas, U.S.A., connected with the Mississippi by the Tensas series of bayous. It flows E., S.E., and S. through Louisiana into the Red R., 15 m. N.W. of the latter's confluence with the Mississippi. Length about 550 m., navigable for steamers to Camden, Arkansas.

Oudenarde, **Oudenaerden**, see **ATDLENAARDE**.

Oudh, or **Oude** (native **Ajodhya**), region and prov. of India extending from the Himalayas (Nepal frontier) to the Ganges (N. to S.), drained by its tribs, the Gomra and the Gumti. Area about 24,158 sq. m. From 1902 it formed part of the United Provs. (O. and Agra) under a lieutenant-governor. From 1921 it was under a governor. The United Provs., from 1937, had an autonomous system of government; but after the resignation of the Congress ministry in 1939 the governor, by proclamation under the Government of India Act, 1935, declared that all the statutory functions would be exercised by him, and vested in himself all the powers of the legislature. In 1947 it was assigned to the new dominion of India. The chief court at O. constituted 1925, sits at Lucknow. Rice, cereals, sugar, opium, tobacco, indigo and cotton are produced. Lucknow is the cap. It was under the Mogul emperors in the sixteenth century, but had an independent Mohammedan dynasty in the eighteenth century, and was annexed by the Brit. in 1856. It played an important part in the Sepoy Mutiny (1857-58). The great ann. fair of Ramnath is held there. Pop. (1911) 11,111,000. See also **AYODHYA**.

Oudtshoorn, tn. of S. Africa, in Cape Prov., on the R. Grobelaars, 277 m. W. of Port Elizabeth. It is an agric. centre, and had an out-fitting school during the Second World War. The Camro stalactite caves are near by. Pop. 17,000.

Ouessant, see **USANT**.

Oughtred, William (1575-1660), Eng. mathematician, b. at Eton, Buckinghamshire, and educated at Eton and King's College, Cambridge. He invented an 'Easy Method of Geometrical Dialling', which was circulated in MS. for some years until Christopher Wren's trans. into Lat., made in 1647, was pub. in 1648. About 1603 O. was ordained priest, and in 1604 presented to the rectory at Albury, Surrey. O. was one of the first among Eng. mathematicians of his day. In his *Clavis Mathematicæ* (1631) he introduced the signs \times for multiplication and $:$ for proportion.

Ougrée, tn. in Belgium, and suburb of Liège, 2 m. to the S.W. on the R. Meuse. It has coal-mines and blast furnaces. Chief industries are iron, steel, machinery, caoutchouc, and chemicals. Pop. 19,200.

Ouida, pseudonym of **Marie Louise de la Ramée** (1839-1908), Eng. novelist, b. at Bury St. Edmunds, began her literary career by contributing to the *New Monthly Magazine* when she was twenty. Her first novel was *Granville de Yvonne* (1863), subsequently known as *Held in*

of scouts. Behind this screen the outpost commander chooses his line, and decides on the positions for the various portions of his force. Patrols are also sent out to observe special points and ground not in view from but near enough to the outpost to be of value to the enemy. All persons passing through the outpost line are challenged, and the outpost commander is given definite orders as to the disposal of the various kinds of individuals, who may endeavour to pass.

Outram, Sir James (1803-63), Eng. soldier, *b.* in Derbyshire. He entered the Indian Army in 1819, and soon acquired an excellent reputation not only as a soldier, but also as a political agent. In 1842 he was described by Sir Charles Napier as 'the Bayard of India.' He rendered valuable service in the first Sikh war, and from 1847 to 1851 was resident at Baroda, and from 1855 in Oudh. He went with Havelock to the relief of Lucknow, and commanded the garrison there during the second siege. He was created baronet in 1858, and appointed military member of Lord Canning's council. He pub. sev. books on India. See lives by Sir F. J. Goldsmid, 1880, and L. J. Trotter, 1903.

Outward Bound Schools. An organisation based on the idea that short-term character-training schools for boys (and perhaps later for girls) should form an integral part of youth education, acting as a power-unit for all social services in collaboration with youth movements. These schools must be founded on the following principles: (1) They must be residential and the courses must last for a minimum of four weeks; (2) they must be open to all, based on a spiritual foundation, and must contain a diversity of occupations and nationalities, without political or sectional bias; (3) they must present each boy with a set of conditions necessary to give him, possibly for the first time, the opportunity to discover himself (these conditions - self-discipline, team-work, adventure, physical fitness, hardship, and some risk - are rarely met with except in time of war); and (4) they must endeavour to develop character through training with a vocational interest.

The Sea School was founded in 1911, and was shaped by two men of forceful mind and Christian purpose—Lawrence Holt, the founder, whose interest gave the venture a nautical bent, and Kurt Hahn, who introduced the concept that the training of adolescents should be devised to produce a 'whole man,' meaning one whose spiritual entity is preserved in its full stature and dignity, clothed in a body developed to the full limit of its natural capabilities. The training at the Sea School, as it will be at all O. B. S., includes self-discipline, team spirit, rescue work to develop 'the Samaritan spirit,' physical fitness, and a useful and an adventurous project. The address of the Outward Bound Trust (limited by guarantee) is, 40 Broadway, London, S.W.1.

Ouverture, Pierre Dominique Toussaint L., see TOUSSAINT.

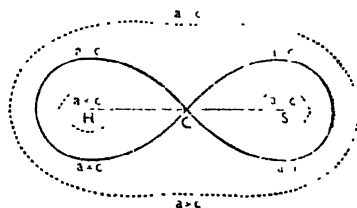
Ouvirandra, Lattice, or Lace-leaf Plant, genus of tropical aquatic perennials (family Naiadaceae) with broad, oblong, and lattice- or lace-like leaves. They are grown in the stove-house in a well-shaded tank, and the lacework of the leaves is shown up by introducing a sheet of white-enamelled iron as a false bottom.

Ouzel, or Ousel, see BLACKBIRD; DIPPER; KING OUSEL.

Ovaherero, see HERERO.

Ovalle, *to.* of Chile, 60 m. S. of Coquimbo. It is the centre of a fruit-growing and mining dist., and wool is also grown. There are thermal springs in the vicinity. Pop. 32,700.

Ovals. *Cartesian O.,* elaborated by Descartes; the locus of a point so moving that the sum or difference of given multiples of its distances from two fixed points remains constant. The ellipse is one of



CASSINI'S OVAL

the family. *Cassini's O.,* the locus of a point so moving that the product of its distances from two fixed points (H and S, $HC = CS = a$) is equal to a constant C^2 . The special case when $a = C$ is called a *lemniscate* (see diagram).

Ovambanderu, see under HERERO.

Ovambo, one of the prin. native races of S.W. Africa. They are a Bantu race, and follow agriculture. They still have an unimpaired tribal organisation. They came into S.W. Africa at a later date than the Hottentots (twelfth century), but before the Hereros, and made their home in the N. of Hereroland. Every O. tribe has its special organisation and particular customs. In physical appearance and growth of hair the Os. resemble the Hereros, but a thicker build, medium noses, whereas the Hereros are often tall. Many Os. like the Hereros, in whom there are a tribal token on their eye-teeth, and their pleasures were tame and protracted expeditions in the uninhabited parts of the tribal ter. Their chief food is a porridge of Kaffir-corn and millet, milk, meat, beans, melons, and ground-nuts. They make plates, bowls, and baskets, both ornamental and useful. Their numbers approximate to 120,000. Ovamboland, even under Ger. rule, was left to the operation of its own tribal organisation, and it represents to-day the one area in S.W. Africa in which this organisation can be utilised by the administration as an organ of government. Its area is about 16,000 sq. m. See H. Vedder, *South-*

West Africa in Early Times (trans. by C. G. Hull), 1938.

Ovar, tn. of Douro prov., Portugal, on the lagoon of Aveiro, 20 m. S. of Oporto, 5 m. from the coast. It is a fishing centre, produces wine, wheat, millet, and onions, and trades in timber. Pop. 12,700.

Ovariectomy, in surgery the removal of the uterine appendages, e.g. the ovaries and the Fallopian tubes. It was first performed by McDowell of Kentucky in 1809, and by Charles Clay of Manchester in England in 1842. In 400 cases which the latter dealt with, the mortality was over 25 per cent; but this major operation, once regarded as one of the gravest in the sphere of surgery, is now associated with a lower mortality than any other. The ovaries may be the seat of inflammation caused by injury during labour, or by gonorrhoeal infection, and of new growths known as ovarian cysts, or dermoid tumours, and of cancerous growths. In addition O. is now practised when through disease the tubes owing to inflammation become distended. An incision is made in the walls of the abdomen, and all adhesions are separated. The contents of the tumour are removed, the collapsed sac is drawn outside the abdomen; and the neck being secured by ligature or otherwise, the mass is cut away and the stump of the pedicle stitched over or buried in a bare portion of the broad ligament. Antiseptic sprays and sponges are generally used, hence the very low mortality now obtained; in some cases this is as low as 4 per cent. *See also* GYNÆCOLOGY. *See* C. Berkeley, J. S. Fairbairn, and C. White, *Diseases of Women*, 1931.

Ovary forms, together with the tubular appendages, the female reproductive system. There is one on each side of the uterus, which is placed in the centre of the pelvic cavity. Each is contained in a fold of peritoneum known as the broad ligament, and connected to the uterus by the Fallopian (uterine) tube. Each O. contains groups of germinal cells, known as Graafian follicles, and in the centre of each of these is a primitive ovum. It has been estimated that there are 30,000 such ova in the O., and these follicles are all connected by and embedded in tissue known as the stroma of the O. The Graafian follicles are contained in the superficial or cortical portion, while the deep or medullary portion is highly vascular, and is reddish in colour. The O. is oval and is about 1½ in. long and ½ in. thick. Ovulation, or rupture of the wall of the Graafian follicle, occurs midway between two menstrual periods, and so an ovum is liberated and passes by way of the Fallopian tubes into the uterus. If it has been fertilised, it then further develops, as explained under BIOLOGY and EMBRYOLOGY, while if not it is thence extruded. The O. produces the female sex hormone, or other hormone, progesterone, is formed in the corpora lutea which develop from the ruptured Graafian follicles. In plants the O. is that part of the pistil which contains the ovule, and from which the fruit will later be formed.

See ANATOMY; BIOLOGY; BOTANY; EMBRYOLOGY; FLOWER; FRUIT; SKIN.

Ovary (in botany), *see* FLOWER; FRUIT; FERTILISATION.

Ovation, lesser triumph (q.v.) awarded to a Rom. *imperator* who had achieved minor success or success in a minor war. The Senate did not head the procession; the general entered on foot or horseback instead of in a chariot; he was clad in the *toga praetexta*, or ordinary magistrate's robe, instead of the *tunica palmata* and *toga picta*, and was crowned with myrtle instead of laurel. A sheep was sacrificed instead of an ox, hence the term (*ovis*, sheep).

Oven. The oldest types of O. are arched in shape, and built of stone or brick, and are heated by burning a wood fire within them. When the walls are thoroughly hot, the fire is raked out and the material to be baked inserted on a long narrow wooden shovel called a peel. The baker's O. commonly in use is an improvement upon this type. Thus the fire is confined to a separate fire-place, either opening into the O., fixed within it, or so arranged that it can be moved about it, thus ensuring equable heating. The or stone is mostly used for the bottom, or sole, of the O., and a draw-plate, or movable false bottom, is substituted for the peel. Coke or anthracite is often used as fuel. Os. for more general use are best made of iron, and are usually heated externally by flues, regulated by dampers, which convey the heat from a fire. For domestic use Os. are heated by superheated steam, by gas, or by electricity, and contain iron shelves which may be moved up or down to regulate the amount of heat which reaches the article to be cooked. Special Os. are made for biscuits and confectionery, containing revolving bands on which the material is baked. The temp. may be gauged by a pyrometer.

Oven-bird, popular name for a genus (*Iunarius*) of S. Amer. psittacine birds. It is so called on account of its wonderful oven-like nest, which is a massive structure, weighing often about 8 lb., and placed on the bough of a tree. It is composed of mud and pieces of sticks and straw and animal hair. The white eggs are laid upon a bed of soft dry grass in a large chamber which is reached through an ante-chamber. The birds are monogamous, and share the duties of incubation. Darwin, in his *Naturalist's Voyage* (1845), gives an interesting description of two species, both of a reddish tint of plumage. One, *F. cuculatus*, builds its nest at the bottom of a narrow cylindrical hole.

Over, anct. bor. of Cheshire, England, now a ward of the urb. dist. of Winford (q.v.). St. Chad's church, restored in 1531 and in 1870, dates back to the twelfth century, and is probably built on the site of an even earlier church. The right of holding a cattle-fair was granted by Edward I.

Overbeck, Johann Friedrich (1789-1869), Ger. painter, b. at Lübeck. At Rome, with others, he formed in 1810 the *Pro-Raphaelite* brotherhood known as the

duties formerly performed by the Foreign Office in connection with commercial intelligence and with the commercial diplomatic and consular services. The Board of Trade has taken over its work.

Overseer, parochial official charged with the supervision of the poor in England and Wales. The office was estab. in 1601 and abolished in 1927. The O formulated and levied poor rates, and prepared valuation, jurv, and voters' lists.

Overstone, Samuel Jones Loyd, Baron (1796-1883), Eng. banker, b. in London, educated at Eton and Trinity College, Cambridge. He was M.P. for Htthe during 1819-26, and contested Manchester in 1832. He succeeded his father as head of Jones Loyd & Company bankers (merged in London and Westminster Bank in 1841) in 1841. He was a great authority on banking and finance, and the Bank Act of 1844 was based on his principles. He wrote sev. treatises on currency, etc.

Overtones, see HARMONICS.

Overtown, tn in N. Lanarkshire 13 m S.E. of W. W. It has extensive iron works, and is situated on the verge of the Clyde valley fruit-growing area. Pop. 2400.

Overture, work intended to serve as an opening to a larger composition, usually in opera, but often a symphony or suite. The early (classical) no. Os, as such, but were generally prefaced as a prologue, often sung. The instrumental prelude became popular in Italy in the 17th c., and was known as a *sinfonia* or *concerto*. The form of the It. dramatic O. assumed a more permanent character with Scarlatti, who divided it into three sections. Lully, in France, laid foundations for the classical symphony by also dividing the O. into three parts, a slow introduction, a lively allegro in fugue form, and a dance form, generally a minuet. This type, called the It. O., became popular in England, and was used by Purcell and Handel. At this stage of its development the O. bore little or no reference to the work it prefaced, so that it was not unusual for the O. to one opera to be played before the performance of another. Nor was the O. confined to the operatic field, but was used also as an opening to plays, oratorios, suite, or ballet. The reforms instituted in the field of the O. by Gluck and Mozart are of the utmost importance. The former closely identified the O. with the opera it prefaced, making it something analogous to the work itself, and often (as for example in *Alceste*) joining it without a break to the first scene. Mozart further solidified the relationship between O. and opera by introducing into the former themes from the later as in *Don Giovanni*. With both composers the O. developed into a single movement, usually in sonata form, but without the repetition of the exposition. Meanwhile the O. branched off in another direction, becoming virtually a symphony, as late as the end of the eighteenth century the symphonies of Haydn, belonging to the Violoncello set, were called Os. In the mid-

eighteenth century the It. O. became increasingly important. The early Os. of Cherubini foreshadowed those of Rossini, with their use of the cumulative crescendo, now known as the 'Rossini crescendo'. Beethoven, continuing the forms of Gluck and Mozart, raised the O. to greater expressive and dramatic heights. The great *Leonore* O. No. 319, to all intents and purposes, a distillation of the operatic *Idello* in symphonic form. The *Egmont* and *Coniolan* Os. were part of the musical drama written for these plays and are in the nature of independent compositions suitable for concert use. The Os. of Weber also adhere to the classical form and are closely allied with the operas using themes appearing in them. In the early nineteenth century an interest arose in the concert O. which, although it was usually written with a dramatic subject in mind, bore no relation to any opera. An example is 'Lullu' by Liszt, *Piano and Violin*, which is in sonata form but resembles the symphonic poem more than the operatic O. Wagner employed the O. in various ways, and no two of his could be said to be alike. With the exception of the O. to *The Flying Dutchman*, which, in classical form, his most important Os. may be divided into two main groups, according to their functions, as a prelude to the first act, as follows: with *Tannhauser*, *Tristan*, and the *Meistersinger*, and primarily intended to set the proper mood, as with *Die Walküre* and *Parsifal*. Yet another type of O. is chiefly a potpourri of themes from the play, arranged with an eye for their effectiveness. Among modern composers the trend of the O. toward the shorter form, intended to prepare the mood of the play.

Overysel, see OYSTER.

Ovid (Publius Ovidius Nason) (43 B.C. - A.D. 17) Latin poet of the Augustan age. He was born at Sulmo (Abruzzo) of an ancient equestrian family in easy circumstances. He was well educated and trained for the Bar, studying for some time at Athens and Athens at Rome. He had considerable literary ability, planned and executed in the century and was made one of the *tresviri capitales*, but on coming into his father's estate left the law to his interests and pleasure. He had many friends and lived a gay and licentious life in Rome and in his country seat. He was three times married, but only his third marriage was successful. In A.D. 8 he was suddenly banished by Augustus to Tomi, now Constanza, on the Danube. No reason for this is certainly known, but the cause is obviously hinted at in several places in his works. He appears to have been in bad odour with the emperor, as has been suggested, about the emperor's grand daughter, Julia, of which Augustus wished to remove all evidence. But the scandalic cause of his exile was the immoral tendency of his love poems (cf. *Tristia*, II, 207-III, 19). O. suffered much from the climate and the lack of company. He was never allowed to return to Rome and died in exile. His work is distinguished by its spontaneity and ease, its graceful elegance, and play.

the blood-vessels of the mother, as in truly viviparous animals. Examples are the marsupials, the viper, the aphids (green flies), and various other invertebrates.

Ovule (Lat. diminutive of *ovum*, an egg), minute body of a circular or oval shape which occurs in the ovary of the carpel of a flowering plant. Os. may be solitary or numerous, and after fertilisation by the action of pollen become seeds. They consist principally of the nucellus, a central mass of tissue covered by one or more coats or integuments, and in most cases they are attached by a short stalk or funicle to the placenta, a ridge of tissue in the ovary. At the anterior end, the micropyle, a narrow canal or opening leads to the nucellus. Down this the pollen tube passes in fertilisation. The form of the O., its arrangement on the funicle, and the relative position of the micropyle vary in different families. In Ranunculaceae, for example, the O. is always inverted, so that the micropyle and funicle adjoin. The Os. are grouped in the placenta in various ways, the chief being axile, free central, and marginal.

Owain ab Gruffydd, see GLENDOWER, OWEN.

Owari, or Bishiu, prov. of Japan, in Honshu; largely a fertile plain, rice, wheat, barley, and horse-radish are extensively produced, and poultry rearing is important. The local clay is used in ceramics, an industry begun in 1297. Chief tn., Nagoya.

Owatonna, tn. in Steele co., Minnesota, U.S.A., on the Straight R., 56 m. S.W. of St. Paul. It is a health resort with mineral springs. Pop. 8700.

Owego, summer resort, cap. of Tioga co., New York, U.S.A., on the Susquehanna. It has trade in agric. products, manuf. leather, woollen goods, and iron, and has flour and timber mills. Pop. 5000.

Owen Glendower, see GLENDOWER, OWEN.

Owen, John (1560-1622), Brit. epigrammatist, b. at Plas Ddu, Carmarvonshire, educated at Winchester and Oxford; he became headmaster of King Henry VIII. School at Warwick. His Lat. epigrams, which have both sense and wit in a high degree, gained him much applause, and were trans. into Eng., Fr., Ger., and Sp.

Owen, John (1616-83), Eng. Puritan divine, b. at Stadhampton, Oxfordshire, and educated at Oxford, from which he was driven by Laud's statutes. Originally a Presbyterian, he passed over to Independency. In 1649 he accompanied Cromwell to Ireland, and in 1650 to Edinburgh. He was dean of Christ Church, Oxford (1658), and one of the 'triers' of ministers appointed by Cromwell. After the Restoration he was ejected from his deanery, but was favoured by Clarendon who endeavoured to induce him to conform to the Anglican Church by offers of high preferment. Strange to say, Charles II. also held him in regard, and gave him money for the Nonconformists; and he was allowed to preach to a congregation of Independents in London. His great

learning and ability rendered him a formidable controversialist, especially against Arminianism and Romanism. His works fill 28 vols.; among the best known being *The Divine Original, etc., of the Scriptures*, (1659); *Indwelling Sin* (1668); *Christologia*, or . . . *The Person of Christ* (1670); and a commentary on Hebrews.

Owen, Sir Richard (1804-92), Eng. naturalist, b. at Lancaster. He studied anatomy at Edinburgh under John Barclay, and, coming to London, held various posts in the Hunterian Museum at the College of Surgeons. He made his name with the pub., in 1832, of a memoir on the pearly nautilus. In 1836 he was appointed the first Hunterian prof. of comparative anatomy and physiology. His prin. works at this time were a *Catalogue of the Physiological Series of Comparative Anatomy* (1833-40); *Odontography* (1840-45); and *British Fossil Mammals and Birds* (1844-1846). In 1856 the queen placed at his disposal for life Sheen Lodge in Richmond Park, and he became director of the Natural Hist. Museum at S. Kensington, for the estab. of which he was largely responsible. His *Anatomy and Physiology of the Vertebrates* appeared in 1868. He was undoubtedly the first anatomist of his day, and one of the greatest that ever lived. See life by his grandson, Rev. R. Owen, 1891.

Owen, Robert (1771-1858), Welsh Socialist, b. at Newtown, Montgomeryshire, was a precocious lad who came to London, worked as a shopman in London and Manchester, and eventually became the owner of successful cotton mills at Chorlton. There, eventually, he instituted a system of co-partnership, and started schools for infants. His scheme, then an entire novelty, attracted much attention, and drew many famous persons to visit and consult him. He wished to improve the conditions of labour, and especially of child labour, and he was the prime mover of the Factory Act of 1819. His open declaration of religious scepticism irritated largely against his schemes. His communist settlements in England and America proved to be failures. His *Idolography* appeared in 1857-58. See lives by L. Jones, 1890; F. Podmore, 1906; and G. D. H. Col., 1930.

Owen, Robert Dale (1801-77), Scottish-Amer. social reformer and author, son of the preceding. Born and educated in Glasgow, he accompanied his father to New Harmony, Indiana, 1825. In 1835 he was elected to Indiana Legislature, and was a member of Congress, 1841-47. O. took a leading part in founding the Smithsonian Institution, and was U.S.A. minister at Naples, 1853-58. Some of his publs. are *Footfalls on the Boundary of another World* (1860); *Policy of Emancipation* (1863); *The Wrong of Slavery* (1864); *Debatable Land between this World and the Next* (1872); and an autobiography, *Threading my Way* (1874).

Owen, Sir Stanley, see BUCKMASTER, BARON.

Owen, Wilfrid (1893-1918), Eng. port., b. at Oswestry, educated at the Birkenhead Institute and at London Univ. He

served on the W. front in the First World War, and was killed at the Sambre Canal. His work shatters the illusion of the glory of war, and, by a rare mastery of the association of words, he brings home to us both the hollowness and wreckage of war and the tender loveliness it has ruined. In technique his work shows one remarkable feature, a then peculiar type of rhyme used to enhance the expression of feeling. In these experiments in assonance and dissonance, well exemplified in his *Strange Meeting*, he substitutes for vowel identity a consonantal identity which is really an adaptation of means to an end. There is a deep humanity of self-revelation in such poems as *Greater Love* and *Apologia pro Poemata Meis*. See S. Sassoon (ed.), *The Poems of Wilfrid Owen*, 1921, and *The Poems of Wilfrid Owen* (ed. with memoir by Edmund Blunden), 1931.

Owen Falls, rapids of the Victoria Nile, in Uganda, situated 3 m. below the Ripon Falls (q.v.). In 1919 an agreement between the Brit. and Egyptian Govs. was concluded for the construction of a dam here, for the production of hydro-electric power and the control of the Nile waters. Plans for this work were prepared by and approved by the Egyptian Ministry of Public Works and the Uganda authorities. The construction of the dam is the responsibility of the Uganda Electricity Board, and when constructed will be administered by that body, which will regulate the discharges to be passed through the dam on the instructions of the Egyptian resident engineer. See also NILE.

Owensboro, co. seat of Davies co., Kentucky, U.S.A., on the Ohio R. The city has tobacco, furniture, and cellulose factories, and also coal and iron mines. The oil found near by has made O. the centre of a large oil producing field. Cattle are raised. Pop. 30,200.

Owens, John (1790-1846), Eng. cotton merchant, and founder of O. College, b. at Manchester. He entered his father's business, and soon making a large fortune he was able to bequeath £100,000 for the erection of a college, the institution in which he implicitly wished to be secular. The Univ. of Manchester may be said to owe its foundation to O. College.

Owen Sound, co. tn. of Grey co., Ontario, Canada. It lies at the head of the large bay of the same name on the S.W. shore of Georgian Bay (Lake Huron), and owes its name to the great impression made by the fine natural harbour on Capt. Owen, who conducted the first hydrographic survey of the great lakes shortly after the war of 1812-14 with the U.S. Owing to his glowing description the Brit. officials gave his name to the bay. The original name of the settlement was Sydenham, changed to O. S. in 1851. Incorporated as a tn. in 1856, it became a city in 1920. It lies 110 m. N.W. of Toronto, on both the Canadian Pacific and Canadian National railways. It is an important livestock shipping centre, and its chief industries include furniture; marine, mining, and heavy castings;

woodenware; refrigerators; knitting; steel boats; stoves and furnaces; bolts, screws, and wire; tanning; lumber; paint and varnishes. Pop. 14,000.

Owen Stanley Mountains, mt. chain in the E. of Australian New Guinea. The highest peak is Mt. Victoria (13,200 ft.), but there are sev. peaks over 10,000 ft. high. In the Pacific campaigns of the Second World War the Jap. in 1912 made persistent efforts to penetrate to the S.E. of the is. in order to secure the mastery of the immediate approaches to Australia, but the O. S. M., which divide the is., proved a formidable barrier to any advance from the direction of Lae and Salamaua (q.v.) (July). But having gained a foothold in the Buna-Gona area and at Milne Bay (whence they were soon driven out again) the Jap. on Sept. 9 succeeded in crossing the range and a fortnight later they were within 32 m. of Port Moresby. The ill-fated attempt by the Jap. to drive the Amercs. out of Guadalcanal, however, led to their abandonment of the initiative in New Guinea. The halting of their advance toward Port Moresby threw them back on the defensive, while their attempts to check the counter-attacking Australians S. of the O. S. M. were abortive, largely because of the growing air superiority of the Allies. After the capture of Forthwaite ridge at the end of Sept., the Australians were faced with little opposition until they had pushed through a gap and made contact with the Jap. on the N. slopes of the O. S. M. On Nov. 3 the Allies took Kokoda and on the 23rd entered Gona. By Jan. 22 the last Jap. forces in the is. were overcome (see PACIFIC CAMPAIGNS IN SECOND WORLD WAR).

Owl (*Strix*), distinguished from all other birds of prey, except the osprey, by the tarsus (of the leg bones) being half the length of the tibia, while the outer toe is able to be turned backwards or forwards at will. Another distinction is in the absence of the aftershaft present in the feathers of all hawks; this is a small accessory plume which springs from the under side of the main feather. Os. are mostly nocturnal in habit, but some hunt for food in full daylight. The head is always large, the neck short and contracted, the eyes are directed forwards and are surrounded by a characteristic ruff of feathers. The short beak is hooked. Os. have long been the subject of much superstition, being universally regarded as birds of ill omen. This has undoubtedly had much to do with their ruthless persecution, and only in recent years has it been realised that they are the most important check upon the excessive multiplication of rodents. In addition to these reptiles, fish, and insects are eaten, and some species have been observed to feed on carrion. Indigestible remains of the food are cast up in the form of pellets.

Of the 14 species, the barn, white, screech, or church O. is the most widely distributed throughout Britain. The colour of the plumage varies, but the upper parts are commonly tawny buff mottled with grey, white, and brown, and

Ox-bird, see DUNLIN.

Ox-bow, type of lake. By meandering courses, rivers may form great loops: the neck of such a loop being eventually severed, a horse-shoe-shaped backwater is formed. The deposition of silt blocks up the ends, thus forming an O. lake. They are found, for example, in the lower Mississippi valley.

Oxenford, John (1812-77), Eng. author, b. at Camberwell, London. An accomplished linguist, he trans. Calderón's *La Vida es Sueño* and Goethe's *Dichtung und Wahrheit*. The knowledge of Schopenhauer's philosophy in England dates from the appearance of his essay on 'Iconoclasm in Philosophy' in the *Westminster Review* (Dec. 1876). From about 1850 O. was dramatic critic to *The Times*, his appreciations being rendered useless through their excessive and indiscriminate amiability. Two of his best known plays are *My Fellow Clerk* (1835), and *Twice Killed*, a farce (1835).

Oxenham, John, assumed name of William Arthur Dunkerley (d. 1911). Eng. author, educated at Old Trafford School and Victoria Univ., Manchester. He spent his early years in commerce, travelling in E. and U.S.A. He later took up the business side of journalism and was associated with Jerome K. Jerome in the periodicals *The Idler* and *To-day*. Turning to writing, he pub. his first novel, *God's Prisoner*, in 1898. This and succeeding romantic novels gave him a vogue, to which in 1913 he added the popularity of *Bess in Amber*, a book of verse. In 1911 his *Hymn for the Men at the Front* became very widely known. This was followed by other vols. of poetry, and after the war he wrote a number of books on the life of Christ, including *The Cedar Tree* (1921) and *The Hidden Years* (1925). He was over eighty at his death.

Oxenstjerna, Axel, Count (1583-1651), Swedish statesman, b. at Fono in Upland, and educated at the univs. of Rostock, Jena, and Wittenberg, became imperial chancellor to Gustavus Adolphus (1612). During the king's absence in Livonia and Finland (1614-16) O. looked after affairs at home. As a diplomatist he arranged the marriage between his youthful sovereign and Mary Eleonora of Brandenburg, drew up an agreement with Denmark jointly to occupy Stralsund (1629), and negotiated the favourable truce of Altmärk with Poland (1630). After Gustavus's fall at Lützen (1632) it was his courage and resourcefulness which kept the Protestant League together, and led, in 1633, to the formation at Heilbronn of the Evangelical Union. In the Dan. war of 1643-45 his tactical skill again proved invaluable. During the brief rule of Queen Christina, O. was handicapped by the jealousy of his young mistress, but he nevertheless emphatically opposed her abdication.

Oxenstjerna, Bengt Gabriëlsson, Count (1623-1702), Swedish statesman, was appointed governor of Masovia, Great Poland, Kurland, and Kulavia (the Polish provs. which his country had conquered) in 1655. His spirited and prolonged

defence of Thorn against the Poles ended at length in a capitulation so dignified that its terms were afterwards included in the Peace of Oliva (1660). For four years (1662-66) he was governor-general of Livonia. As minister of foreign affairs (1680-97) he supported Great Britain, Holland, and the emperor against France and Denmark.

Oxenstjerna, Johan Gabriel (1750-1818), Swedish poet, b. at Fono, was a nephew of Count Gyllenborg. He wrote a trans. of *Paradise Lost*, besides a number of original poems and odes and a eulogy of Gustavus III., at whose letter-loving court his academic effusions and graceful idylls were much admired. O. undertook many political and diplomatic missions for his king and patron, who in return created him marshal in 1792.

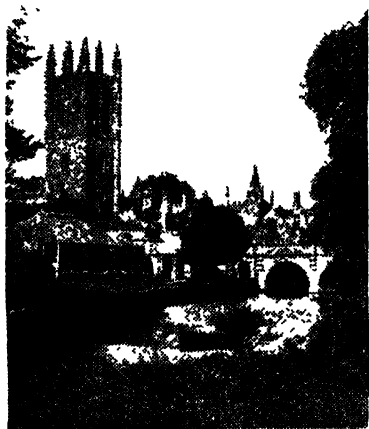
Ox-eye Daisy, or Dog Daisy (*Chrysanthemum leucanthemum*), perennial herb of the order Compositae. It has daisy-like flower-heads with white rays and yellow disk florets.

Oxford, Earl of, see VERN, ROBERT DE.

Oxford, Robert Harley, Earl of, see HARLEY, ROBERT, EARL OF OXFORD AND MORUMBER (1641-1721).

Oxford, city, municipal co., and parli. bor., episcopal see and co. tn. of Oxfordshire, is situated at the confluence of the Thames and the Cherwell, 52 m. W.N.W. from London (6½ m. by rail). Though the tn. is famous chiefly for its univ., it owed its initial rise to other influences. It was situated between Merca and Wessex, on one of the best of the fords across the Thames. Its importance in early times is shown by the first mention of it in hist., which occurs in the *Anglo-Saxon Chronicle* for 912. Here we read that in this year Edward, son of Ethelred, took possession 'of London and Oxford and all the lands obedient to those cities.' The tn. probably made a stubborn resistance to the Norman invaders, and Domesday Book shows the troubles which followed. To prevent further revolt the Norman governor, Robert D'Oilly, built huge works to keep the tn. in submission. The remains of these are to be seen in the castle tower and parts of the churches of St. Michael, St. Peter in the E., and St. Cross. The city again fares prominently in the troubles of Stephen's reign, and in 1142 the Empress Matilda was besieged there, escaping over the riv. on the ice. But, with unimportant exceptions, the fortifications were not again seriously attacked till the seventeenth century, after which it ceased to rank as a place of strength, and rapidly fell into decay, though D'Oilly's tower has successfully weathered the storms of eight centuries, and even now is practically intact. In 1258 the Provisions of O. were drawn up there for the guidance of Henry III., and the Montfort rebellion thus took its rise. Again, in the civil war of Charles I.'s reign, O. figures as the chief cavalier centre, enthusiastic in support of the king. Fable has naturally been busy with the origin of O. Univ. (q.v.), which has been traced back to the time of Alfred. Univ. College, a venerable looking building, was

for many years reputed to have been founded in 872 by Alfred; the assigination, however, was based on a forged charter concocted in the early hist. of the college, and the college really owes its existence to a small benefaction made by William of Durham in the thirteenth century, but of its original building not a stone remains. By many authorities Merton College (1261) is regarded as the earliest of O.'s foundations, and to Walter de Merton is justly due the conception of academic institutions on which the existing colleges are based. Historically, however, we must date the rise of O. Univ. from the beginning of the twelfth century, at which



John H. Stone

OXFORD: MAGDALEN TOWER AND BRIDGE.
On the left, the Botanical Gardens.

time we read that such teachers as Theobald of Ely taught there. There was at first little if any discipline, teachers and scholars gathering quite promiscuously. Organisation began in the thirteenth century, by the end of which O.'s scholars were to be numbered by hundreds. The fame of the univ. grew steadily, until by the fourteenth century it was the equal of any in Europe. But as the univ. grew, there was increased opposition between it and the tn. This opposition often became so acute as to lead to terrific struggles, and the feud survived until modern times in the 'town and gown' conflicts. A very interesting period in the hist. of O. is that which deals with the coming of the friars in the thirteenth century.

The old tn. of O. is built almost entirely in the angle formed by the Cherwell and the Thames, here called the Isis. The four main roads of the tn. meet at the place known as Carfax (derived from

Lat. *quadrifurcus*, 'four-forked'). Carfax Tower, said to have been built in the reign of Edward III., shows indications of a much earlier date. It was renovated in 1894, and the curious 'Quarter Boys' relic of bygone days, restored to use. N. from Carfax runs Cornmarket Street, continued further N. as Magdalen Street. Where Cornmarket Street runs into Magdalen Street it is crossed by a thoroughfare known under the successive names (E. to W.) of George Street, Broad Street, Holywell Street, and Long Wall Street. It sweeps round in a large curve, and roughly marks the boundaries of the ancient city in that direction. Some fragments of the old wall still remain, notably as part of the wall of Merton Gardens. W. from Carfax runs Queen Street, continued as New Street. In Cornmarket Street is St. Michael's Church, the tower is late eleventh-century work. Not far from it is the church of St. Mary Magdalene, an interesting building of various dates. Near by is the Martyrs' Memorial, a monument commemorating the martyrdom of Ridley, Latimer, and Cranmer, designed by Sir Gilbert Scott. S. runs St. Aldate's as far as Tolly Bridge, near which are moored the barges of the college boat clubs. Until near the end of the eighteenth century, an ancient water-tower, known as Friar Bacon's Study, rose over the old bridge. Eastwards from Carfax runs the High Street, off which is the univ. church of St. Mary the Virgin, built between the thirteenth and fifteenth centuries, except for the baroque porch, erected by Laud. It was in St. Mary's that Cranmer was degraded previous to his martyrdom; to St. Mary's were brought from Cumnor the mangled remains of Amy Robsart; and here, its pulpit Keble preached his famous sermon on national apostasy. A fire on the night of Nov. 17, 1916, destroyed the seventeenth century Jacob Schmidt organ and the roof of the chancel, besides devastating an area roughly 80 ft. by 40 ft. This street passes out of O. over Magdalen Bridge. Magdalen Bridge commands fine views N. and S., the former the wooden heights of Headington Hill, with St. Clement's Church in the middle distance, the latter Magdalen College school playing fields and a section of the botanic gardens. In High Street are the examination schools, used in the World Wars as a military hospital, designed by Sir Thomas Graham Jackson, who also designed O.'s 'Bridge of Sighs', connecting the two sections of Hertford College. Opposite to Hertford is the Bodleian Library, most of which was designed by Holt of York. Near it is the Clarendon Building, which for many years was the home of the O. Univ. Press. Designed by Vanbrugh, both of its main elevations are stately; that on the S. contains a figure of Lord Clarendon, from the proceedings of whose book, the *History of the Rebellion*, the building was erected. The New Bodleian, designed by Sir Giles Gilbert Scott, was opened in 1947. Christ Church, one of the smallest, but certainly one of the most beautiful, of Eng. cathedrals, is a splendid example of Eng.

church architecture. The pier-arches are early twelfth-century work, as are the transepts and choir-aisles. 'Tom Tower' of Christ Church contains the famous bell from which the tower gets its name. The statue is that of Wolsey, who planned 'Tom Quad', and to whose genius the conception of the cathedral was really due, though the honour has been assigned to Henry VIII. O. has now expanded to take up many suburbs, Osney and Botley on the W., Grandpont in the S., St. Clement's on the E., and St. Giles's and Summertown, the popular residential dist., on the N. There are sev. well-known schools in O. Magdalen College school was founded in 1180 by William of Waynflete for instruction in grammar; the college choristers, not originally members of the school, have since 1849 been boarded in the master's house at the expense of the college. St. Edward's School, founded in 1863, was originally in New Inn Hall Street, being removed to Summertown in 1873. Others include Headington School, Millham Ford School, and O. High School, for girls.

Before 1914 O. was regarded solely as a univ. city and mkt. tn., printing being then its only c.a. bleable industry. Between the two wars the O. motor industry expanded rapidly, and the city's pop. rose from 67,000 in 1921 to 91,000 in 1938. By 1945 O. itself contained a pop. of 100,000. Extensive development had also taken place immediately outside its limits, so that the total pop. is really much larger. Many of the workers travel daily to Cowley, either from neighbouring vills. and small tns., or by train from Reading, Swindon, and other places further out. O., however, possesses few natural advantages for the location of heavy industry, and the success of the motor industry must be attributed to the initiative and ability of its founder, Lord Nuffield. Unfortunately, the only effective controls on building were those exercised by the physical geography of the site, and the built-up areas now resemble the spokes of a wheel radiating from Carfax, and separated by the valleys of the Cherwell and the Thames. The old walled city was planned on its cramped site at the S. end of the gravel terrace between the two rivers, and is in striking contrast to the unplanned development of recent years. But in 1945 the city council appointed Mr. Thomas Sharp, president of the Tn. Planning Institute, to prepare a master-plan for the future development of O. Since 1881 the city has returned only one member to Parliament: before that date it sent two. The univ. returned two members. See J. Ingram, *Memorials of Oxford*, 1837; C. W. Benson, *Oxford* (in *Historic Tns. series*), 1887; G. Smith, *Oxford and the Colleges*, 1895; P. Dearmer, *The Cathedral Church of Oxford*, 1899; C. Headlam, *Oxford* (Medieval Tns. series), 1907, and *Oxford and its Story*, 1914; A. Lang, *Oxford*, 1916; J. Wells, *The Charm of Oxford*, 1920; J. Betjeman, *An Oxford University Chest*, 1938; C. Hobhouse, *Oxford*, 1938; T. Sharp, *Oxford Replanned*, 1948; and W. J. Arkell, *Oxford Stone*, 1948.

Oxford, vil., 57 m. W. of Pictou, in Cumberland co., Nova Scotia, Canada. Pop. 1400.

Oxford and Asquith (Emma Alice Margaret Tennant), Countess of (1864-1945), sixth daughter of Sir Charles Tennant, wealthy ironmaster of Peeblesshire, and a descendant of Robert Burns, b. in Peeblesshire. Her autobiography, pub. in 1920, recording her vivid impressions of leading men and women, portrays her in her uninhibited youth as an exceedingly versatile and unconventional young woman, a gay talker, a dashing rider to hounds, a student of Plato, and an inveterate flirt. Later she became a conspicuous member of the brilliant Victorian group known as 'The Souls,' of whom Arthur James Balfour was the moving spirit. 'The Souls' were moved by an interest in things of the mind, as opposed to the ordinary frivolous interests of the hour. The romance of her life was her meeting with the rising politician, Herbert Asquith, and her marriage to him in 1894. Asquith put service to his country before other considerations, sacrificing a financially successful career at the Bar to devote himself to politics. There were doubts on the part of many as to the possibility of Margot (her pen-name) being able to subordinate herself to her husband's interests, but the marriage, involving what seemed a difficult adjustment for the bride, in assuming the care of her widower husband's spirited children, was in every way successful. Money conditions were not easy in such a social position for the family. These were the circumstances which led her to take up writing, with the result that a valuable series of pen-sketches of notabilities of her time was made available to the world. In 1920 a publisher offered her £10,000 for her diary. This pub. led to a lecturing tour in America in 1922, when interviewers in scores besieged her. As a writer hers was a personal success rather than a noteworthy literary achievement. The secret of her brilliant reputation lay partly in her good fortune, but still more in her vivid and vital personality. Her pub., in addition to the famous *Autobiography of Margaret Asquith* (1922), include *Plays and Persons* (1923); *Law Sermons* (1927); *Octavia* (1928); and *More Memories* (1933). She had two children, the Honourable Anthony Asquith, film producer, and a daughter, Elizabeth (d. 1915), who married Prince Antoine Bibesco. See Barry Pain, *Marge Asquith*, 1920.

Oxford and Asquith, Herbert Henry, first Earl of (1852-1928), son of Joseph Dixon Asquith, of Morley, Yorkshire, was b. on Sept. 12, 1852. He was educated at the City of London School, and went later as a scholar to Balliol College, Oxford. He distinguished himself at Oxford in classics, taking the Craven scholarship and becoming a fellow of his college. He was also president of the Union. He was called to the Bar after leaving Oxford, and quickly distinguished himself; he defended John Burns in 1887 in the case arising out of the riots in Trafalgar Square, and in 1889 he

was junior counsel for the Irish Nationalist members in the Parnell case. In 1886 he became a member of the House of Commons for E. Fife, a seat which he retained up to the year 1918. In 1892 he moved the vote of want of confidence which led to the fall of the Salisbury gov., and was rewarded by the office of home secretary in the Liberal Cabinet which was then formed. He was bitterly attacked during his period of office when the Featherstone riots took place. Between 1895 and 1906 he divided his time between law and politics, and probably did much to weaken his position in the party by his rigid adherence to imperial ideas during the Boer



Topical Press

LORD ONSLOW AND ASQUITH

war. But on the announcement of the fiscal policy of Mr. Chamberlain, he led the movement which was to unite the Liberal party on economic grounds, and to sweep the country in 1906. In 1907, on the resignation of Mr. Balfour, he became chancellor of the Exchequer in the Campbell-Bannerman gov., and soon became the most prominent man in the party. In April 1908, on the resignation of Campbell-Bannerman, he became Premier. In 1909, when the rejection of the budget by the Lords forced an election, he returned to attack, with the help of the Irish and the Labour members, the veto of the Lords. Following a general election, Nov. 1910, a Veto Bill was introduced and passed, after a threat of creation of peers had led to the withdrawal of the official opposition. In 1911, Asquith, being Premier for the third time, was passed an Insurance Act, and in 1912 Bills for the Better Government of Ireland and Welsh Disestablishment were introduced.

The dominating issue in politics in the

years immediately preceding the First World War, while he was as yet Premier, was Irish Home Rule. He would allow nothing to compromise Liberal policy in this issue. Female suffrage, rightly or wrongly, was supposed to be prejudicial to the Home Rule champions. Hence on the suffrage issue the whole Nationalist party under Redmond rallied to the Asquith banner, and the Plural Voting Bill, in spite of his negative pledge to the suffragettes 'not to use his personal influence against them,' was, fortunately for the Home Rule Bill, lost. Then came the historic Curragh Incident (*see CURRAGH INCIDENT*). Col. Seely, then war minister, resigned, and Asquith abruptly announced that he proposed to act as war minister himself. He handled the situation with tact and skill. Negotiations were now continued for finding some *via media* which would give S. Ireland Home Rule, and at the same time meet the objections of such parts of Ulster as were affected. In March 1914 he announced his readiness to give to each Ulster co. the option of excluding itself from the Irish Parliament. While this Bill made progress towards the statute book, treason was being fomented in Ulster, especially by the importation of arms and the formation of the Irish national volunteers. In this conjuncture the king on the advice of Asquith summoned a conference of party leaders to meet at Buckingham Palace. But no settlement was reached. None could say what might happen, when this and every other question of internal politics became submerged in the cataclysm of the First World War. Asquith resigned the war ministry to Lord Kitchener, and devoted his energies to securing the solidarity of the country against the common enemy. There still remained some difficulty about the Home Rule Bill, which, under the Parliament Act, was now ready for the royal signature. To the statute book the Nationalists demanded that the Bill should go, but the Ulster members asserted that this would be to violate the political truce agreed upon. A similar conflict raged on the fate of the Welsh Disestablishment Bill. Asquith, however, brought in a Bill the purpose of which was, while securing the placing of the Bill on the book, to postpone their operation for at least a year until the war was over.

As a peace Prime Minister he had revealed great qualities as a debater, and much dexterity as a party leader. But to the test of war he showed, at all events in the earlier months, none of the indecision which seemed at a later stage to characterise his policy towards the questions of conscription and the shell shortage. His speeches were admirable expositions of the purposes for which the country was fighting. On the munitions question which was destined to prove his downfall there was believed to be a marked and indeed bitter, difference of opinion between Lord Kitchener and Sir John French (later earl of Ypres) on the kind of ammunition that was suitable. The assumption was without any foundation

whatever. The outcome of the matter, however, was Asquith's suggestion that the interests of the nation were probably better served by the substitution of a non-party gov., and the consequence was a Coalition Gov. drawn from all parts of the House. The Irish Nationalist leader was even offered a post in the Cabinet but he refused. Then came the Irish Rebellion of 1916. After the execution of the ring-leaders, Asquith visited Ireland in the hope of laying the foundations for an honourable settlement. Negotiations were set on foot between the leaders of the opposed Irish factions, Lloyd George being the gov. intermediary. A compromise was reached but soon afterwards wrecked through the influence of the Unionist wing of the Coalition ministry. Among the Unionists at this time conviction was growing that if the war was to be won Asquith should be superseded. The first blow was dealt by Lloyd George by his proposal of a War Council from which the Prime Minister should be excluded, an exclusion which he defended on the ground that the independence of opinion from party influence would thereby be secured. Asquith consented, but yielding to the pressure of his friends afterwards withdrew his consent. Lloyd George retained it by sending in his resignation. Then Bonar Law and the other Unionist members of the Cabinet gave notice to the Premier that they were no longer willing to co-operate with him, and he was thus forced into a resignation and Lloyd George displaced him as Prime Minister (1916). This was really the end of Asquith's long and distinguished record as a minister of the Crown. Apart altogether from the Home Office misfiring the true cause of his downfall was his real or fancied inability to handle the shell shortage problem. Col. Edmondson, *The Times* military correspondent, but in no way in spite of the press campaign, a public revelation of the seriousness of this shortage. Where Asquith failed Lloyd George succeeded. The minutes were forth coming at a huge price to the nation and the war was won. But the transfer of power from the leader to his lieutenant naturally brought with it the bitterest acrimony between the respective adherents and the cleavage was never mended.

In the 1918 Khaki election Asquith was defeated for the first time and found himself in the anomalous position of being leader of the Liberal party and custodian of its funds, yet apparently without the possibility of being returned to the Commons. Ultimately he was returned for Paisley, Black in the House, he was favoured by all his old friends to underwrite the position of Lloyd George. That availed nothing, and when at last the Coalition fell the common disaster induced the two warring sections of the Liberal party to reach a compromise whereby Asquith was accepted as leader with Lloyd George as his chief lieutenant but hardly *fidus Achates*. The former's popularity and authority had now a fresh lease of life and when Baldwin in 1922 committed the blunder of joining battle

over the free trade and tariff issue Asquith exploited the situation with his accustomed powers of strategy and argument. But unfortunately for Liberalism, when he was again returned for Paisley he found that the political battlefield had changed. There was a third contestant in the field, the Labour party. In combination with the Labour party the Liberals could turn Baldwin out of office. In the result Asquith announced that he considered it to be his duty to help the Labour party into power but that he would withdraw his support if it should commit what the Liberals held to be extravagances. The Conservatives never forgave him for this apparent playing into the hands of the Labour party and the brief and glorious eight months reign of Ramsey MacDonald's first gov. was followed by the return of a Coalition gov., with a tremendous majority. Asquith though still Liberal leader once again found himself without a seat. But an impossible situation was clarified in Feb. 1923, when he was re-elected to the Commons, with the title of Lord Oxford and a few weeks later he was made a Knight of the Garter. This left Lloyd George as leader of the Labour party but the assumption that differences between him and Lloyd had been made was disproved during the general strike of 1926 when the collapse of the strike, Lord O. alleged Lloyd George with pursuing a policy of his own towards the strike and intervention by his colleagues. The Liberal press however supported Lloyd George. The quarrel had its effect on Lord O. He had a stroke of meningitis from which though slight he did not fully recover, and he died at Sutton Court on Feb. 1, 1928. His *Memories of a Reflection* published a few months after his death contain well-chosen comments on some of the great events in his long political experience and characteristically rounded observations on the action of his time.

Oxford and Cambridge Cup, trophy competed for annually by Australian universities. It was presented in 1833 by old blues of Oxford and Cambridge.

Oxford Breed, see *see* *see* 11.

Oxford Clay sub group of the Oxford in div. of the Middle Jurassic system, consists of layers of stiff fine-grained clay. It stretches from Dorset where it attains a thickness of about 800 ft. through Oxford to York where it is about 100 ft. thick. The beds are very fossiliferous yielding a monomites (*T. Jason*, *T. Cordatus*, *T. Dimacrus*, *T. Ornatus*, *Belominites* (*T. Hastatus*) and abundant *Lunellinans*, *Synsira ditata* (*Oscra* etc.), *Ammonites* (*Cordatus* and *T. Jason* occur in local fossils. Gastropods and Brachiopods are found, but are not plentiful. Fishes (*Hypobius*, *L. pichobius* etc.) and some reptilian genera (*Ichthyosaurus*, *T. sinuatus*) have been found. In France the rocks are represented by the 'Oxfordien,' and they are found in Germany at the base of the 'White Jura.'

Oxford Group, or Buchmanian, form of



John H. Stone

OXFORD: THE UNIVERSITY CHURCH OF
ST. MARY

On the right is Brasenose College.

religious revivalism founded at Oxford Univ. in 1821 by Frank N. B. Buchman (b. 1878), a wealthy Lutheran evangelist. The O. G. disclaims any intention of establishing a new sect; it aims to serve and to leaven the churches from within by the integrity of its members' lives; and it professes to reproduce the religion of the Apostles without their poverty and self-abnegation. The O. G.'s work of personal evangelism is conducted informally and fatiguedly in groups which gather together in educational institutions, in church congregations, and, more popularly, in private houses. At these 'house parties' there are discussions, personal confessions, known as 'sharings,' and the giving of counsel by the evangelists or 'life-changers.' Groups have been established by Buchman in all parts of the world, and the members have been remarkable for their zeal and sincerity. Four main objections are raised against the system by orthodox churchmen. (1) It ignores the intellectual and institutional side of Christianity; enthusiasm is no alternative for sound reasoning and sacramental grace; (2) the practice of 'sharing' and of reliance upon divine guidance without the discipline of authority in dogma and morals is open to dangerous abuse; (3) the movement is too exclusively bound up with the moods and claims of adolescents; (4) its conception of Christianity is too meagre and limited.

Oxford Movement, known also as the Tractarian Movement, and by its supporters as the Catholic Revival, was an attempt to revive primitive and Catholic religion in the Church of England. Its

proximate cause was the gov.'s abolition of ten Irish bishoprics in 1833, which caused many to ask on what the church could rest if attacked by the gov. The reply came from Oxford in the insistence on the divine mission of the church as the extension of the Incarnation. Newman dates the commencement of the movement from Keble's sermon at St. Mary's, Oxford, on July 11, 1833. In the same year began the pub. of the *Tracts for the Times*. In 1831 Pusey gave the movement the weight of his learning and influence. Other names prominent in the origination of the movement were those of Newman, Keble, and Froude. The *Tracts* evoked a storm of opposition, and in the chaos that followed many of the original leaders seceded to the Church of Rome. The events of this period may be studied in Newman's *Apologia* and Liddon's *Life of Pusey*. But the movement continued with increased vigour, and by the beginning of the twentieth century had transformed the face of the whole Anglican communion. It has promoted home and foreign missions, frequent services, a high standard of clerical life, and reverent ceremonial. There are many books on the subject. See R. W. Church, *The Oxford Movement*, 1891, and W. Walsh, *Secret History of the Oxford Movement*, 5th ed., 1899.

Oxford Sheep, see under SHEEP.

Oxfordshire, or Oxon, midland co. of England, bounded on the S. by the Thames. The surface is varied; the greater part of the co. lies in the Thames basin, but in the N. there are stretches of downs, while the S. is hilly, the greatest elevations being reached in the Chiltern Hills. Part of Wychwood Forest, disafforested in 1862, is found in the W. The chief riv. is the Thames, with its tributaries, the Windrush, Evenlode, Cherwell, and Thame, none of which rises in the co. The scenery in the Thames valley is extremely beautiful, and includes many favourite resorts, Henley, Goring, etc. The soil is good, and agriculture flourishes; the main crops are barley, oats, and wheat, while beans and turnips are also grown. Farming in all its branches is carried on, and cattle, sheep, and pigs are reared. Some iron ore is raised, and brickmaking is an important industry. The chief manufactures are motor vehicles at Cowley, blankets at Witney, gloves at Woodstock, agric. implements and engines at Banbury (which is also famous for a certain kind of cake), with tweed, lace, and paper mills. The co. is served by the W. Region railway, and also by a branch of the Midland Region from Bleicester to Oxford. The co. includes fourteen hundreds, and two parishes, each returning one member. The Rollright Stones and the Devil's Quoit at Stanton Harcourt are well-known prehistoric monuments. Oxford was the chief stronghold of the Royalists throughout the Civil war (1642-46), and was the scene of many engagements. Few of the old castles remain, the most notable being those of Oxford, Shilburn, and Hampton, while there are remains of such celebrated mansions as Minster Lovell, Greys Court, and Ryeford. Of all the

monastic buildings that were the natural outcome of the close proximity of the univ. but few remain, the abbey church at Dorchester being the most important. There are a number of beautiful churches, besides those in Oxford (*q.v.*) itself, including those of Iffley, Adderbury, and Minster Lovell. Area 768 sq. m. Pop. 244,800. See A. Moe, *Oxfordshire*, 1942, and R. Turner, *Oxfordshire*, 1949.

Oxford University. The beginnings of teaching at Oxford cannot be carried further back than the beginning of the twelfth century, when we read that it was the seat at which Theobald of Ely gave instruction (c. 1120). As a corporate body the univ. probably took its rise towards the end of this century or the beginning of the thirteenth. Under the Oxford and Cambridge Act, 1233, a Statutory Commission was set up for Oxford, and many new statutes were made for the O. U. and colleges. The univ. is a corporation consisting of masters and scholars united under the chancellor. The undergraduates and bachelors of arts, being in *statu pupillari*, have no voice in the government of the univ., which rests with the senior graduates. Final control over all acts and business of the univ. rests with the House of Convocation, which consists of all M.A.s and doctors of the higher faculties who have kept their names on the univ. books. Convocation cannot now, as formerly, override the Congregation, but this change is of no real importance inasmuch as the only matter on which it had resisted the Congregation was in the granting of theological degrees to members of all denominations, which matter was resolved by agreement in 1820. Before a proposition is submitted to Convocation it comes before the Congregation of the univ., constituted in 1834, consisting of (1) the chancellor; (2) the officers of the univ.; (3) a body of graduates qualified by residence. This body, besides approving and amending legislation submitted by the Hebdomadal Council to Convocation, has considerable powers in the election of the administrative boards of the univ. The auct. House of Congregation, consisting of college deans, examiners, and certain masters of arts, was once concerned with education and discipline, but now has practically no other function than that of granting degrees. Its former functions were lost under the Act of 1834, which created the Congregation of the univ. The Hebdomadal Council, instituted in 1631, consists of the chancellor, vice-chancellor, and proctors (official members), and a number of other members, heads of houses and profs. elected for six years by the Congregation. It carries on the ordinary business of the univ., including, especially, the initiation in promulgating, considering, and submitting to Convocation all univ. legislation and the control of policy. Ceremonial functions of the univ., which till 1669 were observed in St. Mary's Church, are held in the Sheldonian theatre (built by Wren, 1669). O. U. possesses faculties in theology, law, medicine, *literæ humaniores*, modern hist., Eng. language and literature, medieval and

modern languages, oriental languages, physics, sciences (including mathematics), and biological science, and has boards of studies for music, philosophy, politics, and economics, while there is also a univ. extension board. O. U. awards the usual degrees and diplomas and admits both men and women after preliminary examination (matriculation). Among the scholarships offered, the Rhodes scholarships are some of the most important. These scholarships were founded in 1902 by Cecil John Rhodes, awarded to students from the colonies, America, and Germany. The Bodleian library, founded in 1602, is also the general library of O. U., and contains 1,250,000 vols. and 49,000 MSS. There are also a number of departmental and college libraries. The relations between the univ. and colleges are intimate, all members of the colleges being members of the univ., but the college corporate bodies are distinct from the univ., and manage their own property. For articles on the sev. colleges see under their respective titles: ALL SOULS, BALLIOL, BRASENORSE, CHRIST CHURCH, CORPUS CHRISTI, EXETER, HERTFORD, JESUS, KEELE, LINCOLN, MAGDALEN, MERTON, NEW, ORIEL, PEMBROKE, QUEEN'S, ST. EDMUND'S HALL, ST. JOHN'S, TRINITY, UNIVERSITY, WADHAM, and WORCESTER COLLEGE, which are men's colleges, and LADY MARGARET HALL, ST. ANNE'S, ST. HILDA'S COLLEGE, ST. HUGH'S COLLEGE, and SOMERLEVILLE, which are women's colleges; also NEUFILD and RUSKIN COLLEGES. St. Peter's Hall for men was founded in 1929. In 1918 a donation was accepted for the



John H. Stone.

CHRIST CHURCH, OXFORD: FRONT QUAD KNOWN AS TOM QUAD

estab. of an Anglo-Fr. graduate college, to be called St. Anthony's. In 1948 there were about 8000 undergraduates. See A. Vallance, *The Old Colleges at Oxford*, 1912; C. Headlam, *Oxford and its story*, 1911; Sir C. Mallet, *History of the University of Oxford*, 1924; J. A. R. Marriott, *Oxford: its Place in National History*, 1933; A. M. Rogers, *Days by Degrees*, 1938; C. Hobhouse, *Oxford*, 1939; and *Oxford University Handbook* (ann.).

Oxford University Press, dept. of the univ. wholly owned by 'the Chancellor, Masters, and Scholars,' and by far the

largest institution of its kind in the world. It receives no grant from the univ., nor from any other source, but is self-supporting, the profits being employed both as a source for working capital and to finance the pub. of learned works. It is governed by a univ. committee, the Delegates of the Press. Its prin. depts are (1) the publishing office at Oxford, responsible for the learned and educational books bearing the imprint 'At the Clarendon Press' (a name derived from the first earl of Clarendon, part of the profits from whose *History of the Rebellion* contributed to the cost of a building which housed the press for more than a century); (2) the printing works, also at Oxford; (3) the publishing dept. in London, whose functions have for long included, in addition to the distribution of Clarendon Press books and Oxford Bibles and prayer books, the production of certain classes of books of a less strictly academic character (e.g. the World's Classics series, q.v.), and conveniently differentiated by the more general imprint 'Oxford University Press.'

The first Oxford book is believed to have been printed in 1478 (though the date on the title-page is 1468), but the continuous hist. of the press does not begin until 1585. Many notable works of learning were issued during the next 300 years, and a period of great expansion began towards the close of the nineteenth century, coinciding with the growth of public education. The most widely known Oxford books are no doubt the Bibles and prayer books, and the dictionaries and reference books, notably the great *Oxford English Dictionary*, begun in 1884 and completed in 1928, and the *Dictionary of National Biography*, handed over to the delegates by its original publisher, Messrs. Smith, Elder, in 1917.

Oxgang, see BOVATE.

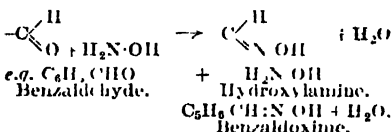
Oxidation, chemical process whereby substances take up or combine with oxygen, as, for example, when magnesium burns in air $2\text{Mg} + \text{O}_2 = 2\text{MgO}$. A substance containing hydrogen can sometimes lose some or all of it in the form of water when oxidised. Thus alcohol, $\text{C}_2\text{H}_5\text{O}$, is oxidised to acetaldehyde, CH_3CHO , by the oxygen-giving mixture of potassium dichromate and sulphuric acid. Further O , by the addition of oxygen, produces acetic acid, CH_3COOH . Thus the result of O may be either an increase of oxygen or a decrease of hydrogen. Extending the term, we may say that the addition of a negative element or radical is a process of O , whereby a compound corresponding to a higher degree of O is obtained, e.g. $2\text{FeCl}_2 + \text{Cl}_2 = 2\text{FeCl}_3$ (see OXYGEN). Ferrous chloride is derived from ferrous oxide, FeO , and ferric chloride from ferric oxide, Fe_2O_3 . Thus O sometimes involves valency increase.

Oxide Paint, paint in which the colour of the pigment is due entirely to inorganic iron compounds. The pigments mix well, are inert and permanent, and vary in colour from dark red to black through purple. They are chiefly used in external painting, in an oil medium.

Oxides are binary compounds formed by the union of the elements or compound radicals with oxygen. They may be divided into three classes: (1) Basic O ; (2) acid-forming O ; (3) other O , including suboxides and peroxides. Basic O are the O of metallic elements which unite with acids to form salts with the elimination of water. Thus $\text{CaO} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$. Acid-forming O , or acid anhydrides are the O of non-metallic elements or negative groups, which unite with water to form acids, e.g. $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$. Some of the higher O of the metals are acid-forming, e.g. CrO_3 , chromic anhydride, unites with water to form chromic acid, H_2CrO_4 . In the remaining class of O , we have the neutral O , such as water (H_2O), which have neither acid nor basic properties; suboxides which are generally reducing agents (see REDUCING AGENT), e.g. lead suboxide, Pb_2O ; peroxides, which act as oxidising agents, e.g. lead peroxide, PbO_2 . (Sometimes an arbitrary distinction is made between peroxides like BaO_2 , which give hydrogen peroxides with dilute acids, and dioxide-like MnO_2 , which do not.) The above classification is not a hard and fast one, as some O may be both acid and basic, e.g. the oxide of tin, SnO , and the oxide of antimony, Sb_2O_3 . See OXYGEN.

Oxides, Alkyl, see ETHERS.

Oximes are compounds derived from the aldehydes (q.v.) and ketones (q.v.) by replacing the oxygen atom of the >CHO or >CO group by the radical >N.OH . This replacement is usually effected by acting on an alkaline aqueous solution or suspension of the aldehyde or ketone with hydroxylamine hydrochloride, $\text{NH}_2\text{OH} \cdot \text{HCl}$, the alkali serving to liberate free hydroxylamine from the hydrochloride:



The O are usually beautifully crystalline compounds, and are used in the separation and purification of the aldehydes and ketones. They are also of considerable interest from the point of view of stereoisomerism (q.v.).

Oxlip (*Primula elatior*), handsome plant with a very limited distribution in the E. cos. of England. It is intermediate in character between the primrose and the cowslip, but may be distinguished from the rather common hybrid between these two plants by the absence of folds in the throat.

Oxon, see OXFORDSHIRE.

Ox-pecker, or *Buphaga africana*, is a species of Starling, the starling family, found in Africa. In colour it is a dingy brown, with tawny under surface and tail. It is a strong flier, of great swiftness, and in habit is insectivorous. Its various names, of which rhinoceros-bird is one, are

derived from its method of seeking food on the banks of the ox and rhinoceros.

Oxus, ancient name of a river in central Asia which is called by the Turks and Persians Jihun, and Amu or Amu Darya by the natives of the country through which it flows. The O rises in the neighborhood of the Hindu Kush flows first W. and then in a general N.W. direction through Badkshan, Bakhara, and Khiva, and empties itself by six mouths into the sea of Aral at its S. extremity. Its total length is about 1100 m. and it drains an area estimated at 221,000 sq. m. A remarkable thing in connection with this riv. is the almost unanimous testimony of antiquity to the fact of its flowing into the Caspian Sea. One of the old bouches of a large riv. have been discovered in the clay of Pishkin in inlet on the E. side of the Caspian Sea. The O. was the boundary of the empires of Cyrus and Alexander.

Ox-wagon Sentinel, see OSSIFYA BLIND WAGON.

Oxy-acetylene Welding, see WELDING.

Oxychlorides are compounds which may be looked on as being intermediate between oxides and normal chlorides. Their formation is brought about by the addition of excess of water to the chlorides but only a few react to form O. and the compound is not easily prepared pure or of definite chemical composition. (Non metals such as phosphorus form O. e.g. POCl_3). The O. may be regarded as basic chlorides or other est. compounds of such e.g. BaSO_4 . BaOCl_2 may be regarded as the anhydride of the basic salt with chloric acid.

Oxycoceus, genus of evergreen shrubs or subshrubs (family Vaccinaceae). *O. palustris*, common cranberry, grows in peat bogs and other swampy places and bears the dark red berries. *O. macrocarpus*, another cranberry, has large fruit and is extensively cultivated in the U.S.A. and to a small extent in Britain for its production. They can be introduced to suitable places such as in wet low lying bogs near ponds or streams by cuttings set about 2 ft apart each way.

Oxge (Symbol O) atomic number 8, atomic weight 16.00, standard, valency 2 and sometimes 1, in oxonium compounds (O^+) is the most abundant and important element. It to ms 23 per cent by weight of air, 89 per cent of water and about a half of all the rocks which comprise the crust of the earth. It was discovered by Scheele (1771) but the discovery was not published until after Priestley (1774) had described its preparation from mercuric oxide. The gas is produced on the small scale by the decomposition of potassium chlorate. This is heated either alone or with a catalytic agent such as manganese dioxide. Thus $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$. On heating manganese dioxide to bright redness O is evolved, $3\text{MnO}_2 \rightarrow \text{Mn}_3\text{O}_4 + \text{O}_2$. The gas may also be obtained by the action of sulphuric acid upon the dichromate or permanganate of potassium, by the action of heat on many oxides and O containing compounds (e.g. nitrates), by the

action of strong sulphuric acid on peroxide, bleaching powder with a catalyst (cobalt oxide), sodium peroxide on water, hydrogen peroxide and manganese dioxide and many other reactions. The O made on the commercial scale is now obtained by the distillation of liquid air (O_2) and is the product in some electrolytic process. O is a colourless gas, tasteless, colourless, and slightly heavier than air. One lit. of the gas weighs 1.429 gm. at normal temp. and pressure. It is slightly soluble in water (1 c.c. of water dissolves 0.0481 c.c. of O at 0°C and 760 mm.) and it is more soluble in water which absorbs about twenty times its own volume of the gas. The critical temp. of the gas is -118°C , at which it is a pressure of 59 atmospheres is required to cause its liquefaction. Liquid O is a pale blue liquid which boils at -183°C , at which temp. its sp. gr. is 1.1. The liquid is strongly magnetic. The gas is condensed with very powerful chemicals in series of bulbs with from 1 to 100 mm. of mercury at ordinary temperatures. The oxidation may proceed so rapidly as to cause the material body to be consumed.

In an experiment by Lavoisier it is known as combustion. The substances are usually regarded as being consumed in O. If the temp. is high enough, the steel wire will glow with a red glow and brilliant light. The combustion (or oxidation) of O will not take place if the gas is at high pressure. This property of the gas is used in the distillation of a sealed tube of O. It is used in combustion taking place at a high temp. is capable of supporting the flame and the heat is maintained by the slow combustion of digested foodstuffs by the O taken in by respiration. Animals cannot breathe with air at a high pressure of temp., but recourse is taken to the addition of the gas in a soda siphon or under circumstances of a cat for the prostration of an animal. The necessary oxygenation of the blood is not possible owing to the fact that the O. is usually the gas is used for a long time at high temps. as in the oxyhydrogen flame used for welding.

The element O exhibits properties of a non-metal. **Oxygen Apparatus** (Brazier's Apparatus), equipment employed by firemen and mines rescue squads for life saving operations in smothered or poisoned areas. It is also largely used in chemical works, gas welding, etc. for the purpose of welding. The commonest apparatus in use is the closed circuit self-contained oxygen breathing apparatus. This is a canvas and leather harness worn by the fireman to which is affixed the oxygen apparatus which consists of a small cylinder containing pure oxygen and pressure (120 atmospheres or approximately 1800 lb. per sq. in.) valve group, gauge, special breathing valve, 10 ft. tubing, 10 ft. breathing tubes, mouthpiece, etc. The oxygen supply is usually sufficient for 4 hrs. or 1 hr. 45 min. and the reducing valve prevents high pressure oxygen from being direct

to the wearer. The flow is regulated to provide about 2-24 litres of oxygen per minute which is sufficient amount for all normal purposes and conditions encountered but may be increased at will. The oxygen is fed to the breathing bag and then to the wearer's mouth. The exhaled air enters another compartment



SAFETY HATH HILL LIAISON
APRIL 1915

1 oxygen cylinder 1 hour 15 min
2 automatic pressure 1 valve for supplying 1 cylinder 10 breathers 1 graduated in air 15 ft 1 time in minutes 6 per 1 cooler 8 10 15 20 25 30 1 the bag 9 breathers 1 tub 1 12 nose clip 13 1 ball 14 1 sorbent canister 15 1 left 15 1 right 1

of the bag, when a special absorbent removes the exhaled carbon dioxide before the purified air is mixed with the fresh supply of oxygen to the wearer. Hence the "closed circuit." The type of breathing apparatus used by Swenson has a supply of oxygen sufficient for 4 hr. or 1 hr. in mines rescue work supply for 2 hrs. is provided. Some types of appar-

atus instead of oxygen carry compressed air in cylinders.

Oxylobium, genus of evergreen leguminous shrubs bearing racemes of yellow, red or purple flowers, and some of them handsome foliage.

Oxypetalum, genus of evergreen twining plants (family Asclepiadaceae) bearing fragrant blue, rose or orange and purple flowers; natives of S. America.

Oxyrhyncha, name given by L. Agassiz to the third tribe of decapod crustaceans in the div. Brachyura. All the species are marine and frequently they inhabit great depths. The carapace is narrow in front and the legs are very long; the creature is slow of movement, unable to swim, and soon die out of water.

Oxytropis, genus of perennial plants (family Leguminosae) bearing decorative foliage and racemes of white, yellow, blue or purple flowers; frequently grown on sunny rockeries. *O. lambertiana* one of the best garden species. *O. campestris* and *O. melissensis* are natives of Scottish hills.

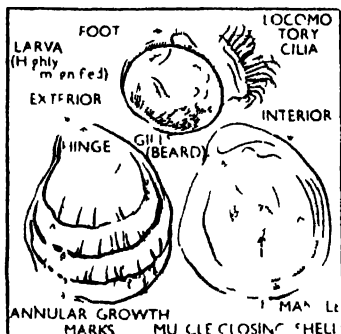
Oyama, Iwao, Prince (1842-1916). Japanese soldier in Suisan. Joined military service in 1860. Having served a term in the Prussian army in 1870, he returned to his own country and in 1875, during the Suisan revolt, threw in his lot with the Imperialists. During the war with China (1895) he served at Port Arthur and seized Wei-hai-wei being commander in chief of the Second Army, and during the Russo-Japanese war of 1904 he commanded the forces in Manchuria. Minister for war 1880-85; he was chief of the general staff 1891-1906. In 1914 he was made keeper of the privy seal.

Oyer and Terner (to hear and determine). The commission of Oyer and Terner directed to his majesty's judges or other commissioners *ad hoc* is that by virtue of which the judges of assize on circuit have power to hear and determine treasons, felonies, and misdemeanours. It is the most comprehensive of all the commissions which constitute the authority of the judges of assize (see also *ASSIZE*, *DETERMINATION* and *JUSTITIA*) and under it persons may be tried whether in custody or on bail.

Oykell, riv. of Scotland forming part of the boundary of Sutherland with Ross and Cromarty. It rises near Ben More Assynt and passing through Loch Ailsh joins Dornoch Firth at Bonar Bridge after an east-south-easterly course the valley forming a gap in the N. Scottish hills.

Oyster (*Ostrea*) belongs to the genus of molluscs represented on nearly every shore. The bivalve shell is unequal the upper valve being flat and thin the lower one by which the shell adheres to a rock or other submarine body being concave and larger. They are hinged together by an elastic toothless ligament. The shell is rough externally and composed apparently of broken layers; within it is smooth and white or pearly. The valves are built up by the mantle a thin contractile tissue with double edges each of which is bordered by a short fringe. The Oyster gets its food, which consists of very minute organisms by lying with the valves open

four flat labial palps or lips assisting the food to the large dilatible mouth. On each side are a pair of simple gills placed between the folds of the mantle. All produce vast numbers of eggs, the common *O.* is computed to produce more than 1 000 000 during the summer than are



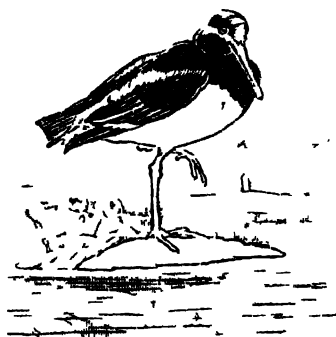
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discharged into the gills, where they remain until hatched, when they escape into the mud. In the free-swimming period numbers are decimated by slight variations of temp. and by enemies. Only those that survive ultimately attach themselves to a rock or other substance. If they escape their number increases, they grow in the course of five or six years into a shell fish sufficiently large for the table. Although the Brits know the extent of *O.* culture in France, to a limited extent it is only within the last year that it has been revived. The number of localities suitable for *O.* culture in France is so numerous that the water is cold in summer, and cannot exist where there is sand, it works its way into the hinge of the shell, it vents it from opening and closing, it soon kills the animal. Sewage pollution is not harmful to the *O.*s themselves, but there is serious risk of infecting them with typhoid and other diseases fatal to the beds must therefore be free from any possibility of impurity. The culture of *O.*s is in itself an important industry, but usually the fattening or fattening is done on other grounds, where if being fattened, that initial breeding grounds, is also suitable fattening places. The fattening beds at Whitstable Kent are probably unique in the world. One of the most important breeding grounds is there also. It is the transplant and is carefully fattened *O.*s that are called natives. *O.* fishing in the open sea is carried on in a few places by diving, but usually by means of a dredger which is pulled along the bottom, fears up *O.*s of all size. *O.* culture has become an important industry in France, the chief beds are at La Rochelle, Marennes, Rochefort, the Isles of Ré and Oléron the Bay of St. Pierre Caudal and Gravelle. The art of artificial breeding

is distinct from *O.* culture, was developed in France at St. Brieuc by Prof. P. Coste in the middle of last century. There are important beds in many other European countries. *O.* fishing is a very important activity in the U.S.A. those from certain beds in Chesapeake Bay and points on the New England coast being specially favoured. The 'Blue Points' are a famous brand. Not only are enormous quantities sent fresh to the big cities, but thousands are canned and shipped to many parts. The States mainly get their *O.*s from the Gulf of Mexico. As the beds are free from the diseases and parasites that have attacked the Brit beds the Amer. *O.*s are very much cheaper. The *Pinna* are a family with genera *Pinna* (fan shell) and *Pecten* nearly related to the *O.* They are found chiefly in the Mediterranean, where they sometimes attain a length of over 2 ft. Fresh water *O.*s (*Unio*) found in rivers in America are cultivated for the shells used in button making.

Oyster Bay, harbours in summer is off of Nassau, New York U.S.A., on the N. coast of Long I., is connected with New York a distance of about 2 m. by a steamboat service and is in addition a favourite seaside resort and summer resort. *O.* fishing is well known in the harbor of the city of New York.

Oyster-catcher, Mussel picker or Sea Pie (*Haematopus ostragus*) bird of the shore family, fairly common on British shores though it often goes up as many miles inland to breed, it nests in mud at a height of over 100 ft. It is usually a rich streaked bird, but in the fall it becomes more of a uniform brown or black. British specimens



OYSTER-CATCHER

show the duties of incubation. They swim and creep very slowly down the shore, and in a few hours all and in five or six weeks are able to fly. In the end of July the birds congregate in large flocks on the coast. The long bill is perfectly adapted for forcing open the shells of molluscs, but both marine and

terrestrial worms and insects are also consumed. The birds are about 16 in. long; the head, neck, and upper parts are black, and the under parts white, but pure white specimens occasionally occur in large flocks.

Oystermouth, see MUMBLES.

Oyster Plant, see SALISFY.

Ozanam, Antoine Frédéric (1813-53), Fr. scholar, b. at Milan, and educated at Lyons. Whilst studying law in Paris he associated with Chateaubriand and Montalembert, and became, with them, a champion of the Catholic revival. From 1840 onward he was prof. of foreign literature at the Sorbonne. His chief writings are *Dante et la philosophie catholique au XIII^{ème} siècle* (1839) and *Études germaniques* (1847-49). See study by H. Auer, 1933.

Ozark Mountains, range of highlands, rarely rising above 2000 ft., which, beginning from the Missouri R., extend in a S.W. direction almost to the Arkansas R. They traverse chiefly the States of Missouri and Oklahoma, but also cross the S.E. corner of Kansas and the N.W. of Arkansas.

Ozokerite, part of native paraffin, which appears in consistency like wax or spermaceti. The colour varies from the white of the pure substance to green and yellowish-brown, and often shows a greenish opalescence. It melts at about 63° C. and is lighter than water. The impure solid found in Galicia and Rumania is purified by treatment with concentrated sulphuric acid and distillation. Original O. from Moldavia is soluble in ether, giving a yellow solution. The wax is used for making candles, sealing wax, and insulating material.

Ozone, allotropic form of oxygen found in very small quantities in the lower atmosphere but in considerable quantities at a height of 30 m. above sea level. O. is formed out of the oxygen of the air by an electrical machine in operation, and when lightning discharges occur; it is also found in the oxygen prepared from the electrolysis of water. Varying quantities of the gas are obtained during many processes of slow oxidation at ordinary temps., e.g. oxidation of phosphorus in air. During the combustion of ether on red-hot platinum, a considerable amount of O. is formed. The gas is best obtained by exposing pure dry oxygen to the influence of the silent electric discharge. A simple apparatus for this purpose consists of a straight piece of narrow glass tube, con-

taining a straight platinum wire inside which passes through the walls of the tube at one end and is there sealed into the glass. A second wire is wound round the outside of the tube. On connecting the end of the outer wire and the free end of the platinum wire to the terminals of an induction coil and passing a slow stream of oxygen through the tube, the issuing gas is found to be highly charged with O. O., as prepared above, is always mixed with excess of oxygen (80 per cent or more), and even in this diluted state it has a strong unpleasant smell which induces headache, and it has an irritating effect on the mucous membrane. The gas is slightly soluble in water, 1.5 c.c. dissolving in 1000 c.c. of water. It condenses to an intensely deep blue liquid which boils at -112° C., and is a very explosive substance. O. is a powerful oxidiser; it attacks and destroys organic matter, indiarubber being quickly rotted through by its action. It bleaches vegetable colours, and acts at once upon most metals, silver and mercury being converted into oxides. Sulphides are converted into sulphates, and the gas also liberates iodine from potassium iodide. This latter constitutes a rough test for the presence of the gas, the liberated iodine forming a blue compound with starch solution. From the observation that two volumes of O. when heated to 250° C. are transformed to three volumes of oxygen, the difference between this latter gas and its allotropic is explained by giving O. the formula O₃, i.e. it contains three atoms to the molecule, whereas the oxygen molecule only contains two atoms. If this be the case then, since the molar weight of oxygen 16, that of O. will be 24. This is confirmed by the rate of its diffusion, which is proportionately slower according to Graham's law. The O. present in sea air is supposed to explain its bracing effects. The gas is employed for purifying drinking water, for bleaching purposes, and for thickening oil. It has also been used for freshening the atmosphere in underground railways (e.g. in London). On the large scale it is prepared by suitable modifications of the electrical process described above.

Ozothamnus, genus of evergreen flowering shrubs (family Compositae), natives of Australia. *O. rasmundii* bears small heads of white flowers and fragrant leaves. It is hardy in sunny sheltered borders or against sunny walls in the S. of England. It attains a height of from 6 to 10 ft.

P, sixteenth letter of the Eng. and other W. European alphabets, descended, through the medium of the Gk., Etruscan, and Lat. alphabets, from the N. Semitic *pe*, meaning 'mouth,' but it is unlikely (although many eminent scholars still hold such an opinion) that it represented in its original form a mouth. Indeed the original name seems to have been chosen independently of the form of the letter, which was p or q (the script being from right to left). *P* is the thin letter of the labial series (*p, b, f, v*) and is interchangeable with the other letters of the series. *P* in Sanskrit, Gk., and Lat., is replaced by *f* in the Germanic tongues (see *F*). Words beginning with *p* in Eng., and its kindred Germanic tongues, are almost all of foreign origin (Slavic, Celtic, Lat.), as *pain* (Fr. *peine*, Lat. *paena*), *plough* (Polish *plug*), *pit* (Lat. *puteus*, a well). The Gk. preposition *apo* (Sansk. *ap*) became in Lat. *ab*; Gk. *hupo*, Lat. *sub*; Sanskrit *upa*. Lat. *ob*; but before sharp letters, as *l* and *s*, the original *p* was retained in pronunciation, as is shown by inscriptions (*capitulū, optinū*). There are remarkable interchanges of *p* with the sharp guttural *k* or *q* (see under *INDO-EUROPEAN LANGUAGES*, where the subdivisions into *P*-group and *Q*-group are mentioned). Thus for Lat. *quis, quod, quum*, the Oscan dialect had *pis, pod, pum*; Lat. *equus, conuo*, corresponded to Gk. *hippos* (Eolian *hikkos*), *pepos*; similarly Gaelic *mac* (son), *ceathair* (Lat. *quatuor*, four), *coig* (Lat. *quinque*, five), correspond to Welsh *map, pedwar* (Gk. *pellores*), *pump* (Gk. *pent*, or *pentem*). In Gk. *p* is sometimes replaced by *t*, as *tis, tessares*, for *pis, pellores*. In such words as *raucemul*, *consumption*, *p* has been introduced as an intermediary between the incompatible sounds *m* and *t*. The initial *p* of Lat. words has for the most part passed into Fr. unaltered; in other positions *p* has become *r*; thus Fr. *écuyer, cheveu, décevoir, pauvre*, from Lat. *episcopus, capillus, decipere, pauper*. In chem. *P* is the symbol for phosphorus, *Pd* for palladium, *Po* for polonium, and *Pt* for platinum.

Paardeberg, mt. of the Orange Free State, on the Modder R., S. Africa. It was here in 1900 that Gen. Cronje (*q.v.*) and his army surrendered from starvation, a Brit. attack on the Boer entrenchments having failed.

Paarl, or The Paarl: 1. Dist. of Cape Prov., S. Africa, noted particularly for its vineyards. 2. Cap. of the above dist., 36 m. N.E. of Cape Town, on the Berg R. Large quantities of fruit and tobacco are produced in the vicinity, and there is wine-growing, fruit-canning, jam-making, a baking-powder factory, textile m'f. etc. Pop. (tn.) (white) 10,900, (other races) 15,600.

Pabianice, tn. in the prov. of Lodz,

Poland, 10 m. to the S.W. of Lodz. Its chief occupation is the manuf. of textile fabrics. Pop. (1939) 40,000.

Pabna, cap. of the dist. of the same name in E. Bengal, Pakistan, 76 m. W.N.W. of Dacca. Area of dist. 1936 sq. m. Pop. 1,705,000 (tn. 23,500).

Pana, see *COLOMBUS*.

Pacaraima Sierra, range of mts. in S. America, in L.A. N., and extending from W. to E. for over 200 m. They form a boundary line between the basins of the Orinoco and Rio Branco Rts., and also between Venezuela and Brazil. Highest peak, Mt. Roraima (8600 ft.).

Pacasmayo, tn. in dept. of Peru, in the dept. of La Libertad, 60 m. N. of Salaverry. Connected by rail with Guadalupe and Chilote, it exports rice, silver and copper, cotton, and hides. Pop. 1,000.

Pacchiarotto, Jacopo (1461 c. 1510), It. painter, b. at Siena. From 1530 to 1535 he was concerned in conspiracies against the gov., and was compelled to flee into hiding in France. In 1539 he was exiled, but was allowed to return to Italy in 1540, the supposed year of his death. Many works attributed to him are authentic, but among those which are in 'Ascension' in the Siena Academy.

Pace, measure of length, derived from the Lat. *passus*. The latter, however, was measured from the heel-mark of one foot to the mark where it next touched the ground, thus equalling in the modern sense of the word two paces. The Lat. *passus* was a little less than 5 ft., a thousand of them went to a Roman mile. As a unit of measure paces are only reliable when taken by trained persons, such as a troop of soldiers.

Pacelli, Eugenio, see *PAS* (popes), *Pius XII*.

Pacha, see *PASHA*.

Pachacamac, anc. city of Peru, on the coast, 20 m. from Lima, the site of which has been excavated by Peruvian Americans. The Incas adopted the earlier god *P.* as a god of earthquakes. To the Yuncas *P.* was a creator-god, and the tn. was built and had a great temple; it remained a sacred city up to the Incas.

Pacheco, Francisco (1571-1651), Sp. painter, b. at Seville. In 1611 he visited Madrid, and eventually opened a school of painting in Seville. Among his pupils here was Velázquez, who married his daughter. The latter part of his life was spent in literary work, chiefly on the subject of painting. Some of his best paintings are in Madrid and Seville.

Pachm..., Vladimir de (1848-1933), Russian pianist, b. at Odessa. His musical education was obtained in Vienna, and on returning to Russia in 1869 he continued his studies, beginning public performances in 1882. He was famous as a player of

Chopin's music and received the Royal Philharmonic Society's medal, 1916.

Pachmarhi, hill station of the Deccan, in the Central Provs., India, on the Mahadeo range, at an altitude of 3500 ft. It is the summer seat of gov. for the Central Provs. Pop. 6700.

Pachomius, see under MONASTICISM.

Pachuca, cap. of the state of Hidalgo, Mexico, 55 m. N.E. of Mexico city. In the vicinity are silver mines of great antiquity, yielding at the present time a considerable quantity of ore. The surrounding hills are honeycombed with old workings. Three railways and a good motor road lead to Mexico city. Buildings of the Sp. colonial period include Las Casas (1670), now used as offices; Las Casas Coloradas (1785), now courts of justice; and a former Franciscan convent (1596). It has a fine modern theatre and another modern building is the Bank of Hidalgo. Pop. 54,000.

Pachydermata, classification of mammals, founded by Cuvier, for a number of thick-skinned, non-ruminant, hoofed animals, e.g. elephant and hippopotamus.

Pacific Affairs, Institute of, unofficial non-sectarian, non-controversial organization which aims at the improvement of the relations between the peoples of the Pacific area. It is directed by a Pacific Council on which each of its constituent national units elects a member. The countries represented before the Second World War were the U.S.A., Japan, China, Hawaii, Australia, Canada, and New Zealand. It has a permanent secretariat, with headquarters in Honolulu, which is responsible for the preparation and conduct of conferences and the promotion of research. It derives its support from research foundations and private contributions. The origin of the I. P. A. is traced to a group of business and professional men in Hawaii, and the proposal that representatives of the various peoples around the Pacific should meet and exchange views was carried out in the first conference, which met at Honolulu in 1925. Many conferences have been held since then and the proceedings published by the Univ. of Chicago Press. Many painstaking books on different topics have been published by members under the aegis of the institute which, however, is not responsible for the opinions expressed in them. The I. P. A. series of monographs by various authors includes among the most recent K. Feltzer, *Katrine Greene*, J. D. Phillips, and Kate L. Mitchell, *Economic Survey of the Pacific Area, 1912*. Its periodical, *Pacific Affairs*, is published in the U.S.A.

Pacific Campaigns or Far Eastern Front, in Second World War. *Japanese Invasion of the Southern Pacific and Eastern Asia.* — For some time it had been evident that the more moderate elements in the Jap. Gov. had been reduced to impotence by the military party (see JAPAN, History). Allied diplomatic circles conceived the idea that Japan's military and financial resources were too deeply committed in China to permit her to attempt further military adventures elsewhere, and it

was even supposed that the Jap. Gov. was anxious to 'liquidate' the Chinese 'incident' and to extricate its armies. This idea was, of course, sedulously fostered by Jap. propaganda, and colour was lent to the belief by the 'negotiations' which were being ostentatiously conducted at Washington by Adm. Nomura and M. Kuroki to settle Amer.-Jap. relations. In the midst of these bogus negotiations the Jap., without any formal declaration of war, swept down with their bombers and two-man submarines on Pearl Harbour (q.v.) (Hawaii) and other Amer. bases in the Pacific, and sank a Brit. gunboat in Shanghai (Dec. 7, 1941). Within a day or two, apart from the severe damage in Pearl Harbour, Jap. bombers damaged the smaller Amer. bases at Wake Is. and Midway Is., attacked the Nanai Is. (Australian mandated ter.), bombed Guam (U.S. ter.), Hong Kong, the Philippines and other is., and attacked Sarawak and Borneo. In the attack on Pearl Harbour the Amers. lost two battleships (*Arizona*, 32,600 tons, and *Oklahoma*, 29,000 tons) and two destroyers, and six other battleships, three cruisers, and sev. smaller vessels were damaged, 2729 men were killed and wounded. At the same time Jap. troops landed in N.E. Malaya and attacked Kota Bharu aerodrome, Thailand (Siam), which the Allies had expected, though without good reason, to resist a Jap. invasion, surrendered at once and granted passage to Jap. forces landing in the S. It was therefore obvious from the widespread nature of these attacks and their thoroughness that Japan had been preparing the blow for sev. months or even years. Britain and the U.S.A. had no other course open to them than formally to declare war on Japan.

The hist. of the first few months' campaigns, following Japan's entry into the war, was one of futile bravery on the part of the allied forces against overwhelming odds. The crux of the whole situation was, as ever in the hist. of war, sea-power, and the Jap. Navy was in control at the very outset. The Amer. Navy had suffered at Pearl Harbour and in the loss of Guam and Wake Is., the worst blows in its hist. As early in the campaign as Dec. 10, Britain lost the great new battleship, *Prince of Wales*, and the *Repulse*, bombed and torpedoed by sixty Jap. bombers and twenty-seven torpedo-carrying planes, while engaged in operations against Jap. landings off the Malayan coast, a hopeless air fight mission, since the ships had no aircraft protection. In quick succession the Jap. overran most of the Philippines, unleashing the open city of Manila to merciless and indiscriminate bombing, seized Hong Kong, swept over the Malaya Peninsula and captured Singapore, prin. bastion and base of the allied nations in the Far E., and reduced one by one various strategic points in the Netherlands E. Indies. Then the tide of conquest approached Rangoon, entry port for the all-important Burma Road (see BURMA ROAD) down which Britain sent munitions to Chiang Kai-shek.

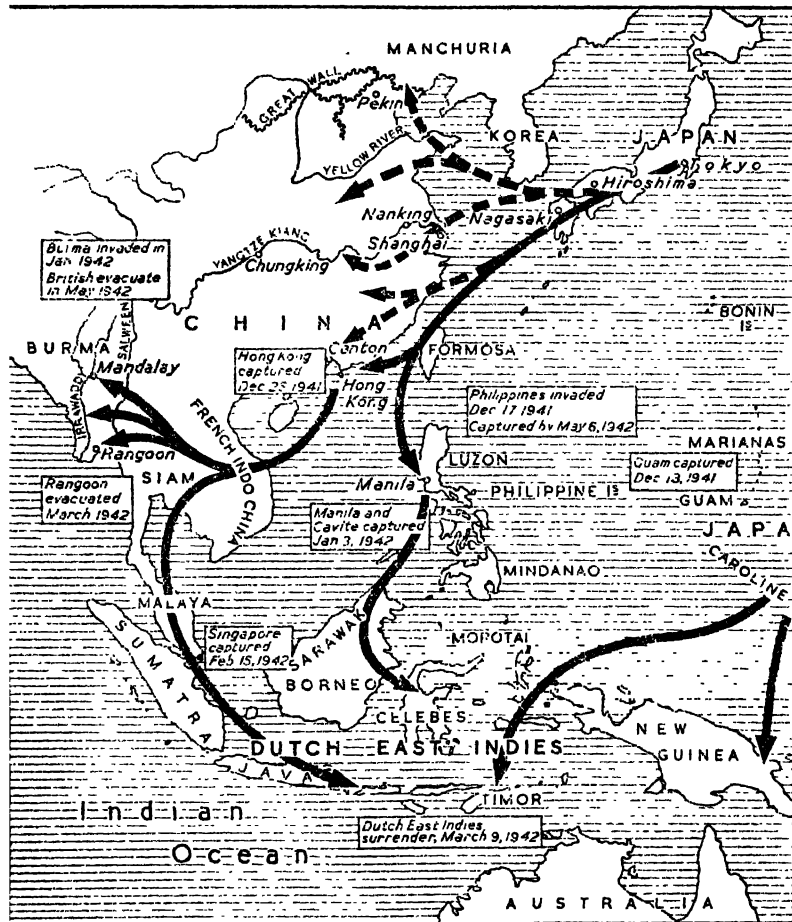
and was imperilling India itself. Southward it now began to menace Australia. By the first days of May Mandalay had fallen and a large part of Burma was in the enemy's hands. The general strategic plan developed quickly from the opening day of the Jap. attacks, their first aim being to break the ring of 'encirclement' constituted by the Aleutian Is., Pearl Harbour, Guam, Manila, Hong Kong, Malaya, and Singapore, by simultaneous attacks on all of them, and then, by breaking Amer. and Brit. resistance in these centres, to render it impossible for the Allies to get near enough to Japan to bomb Jap. cities. In the gloom of these early months from Dec. to April 9 the one bright outstanding feature was the heroic and protracted Amer. defence of the Bataan Peninsula by the forces under Gen. MacArthur. When at length the resistance ended (Gen. MacArthur had already been in Australia for three weeks, where he took supreme command of Australian, Brit., Dutch, and Amer. troops).

In the course of the Jap. conquest of the numerous Is. of the S. Pacific the hardest fighting took place in the Philippines. Manila and Cavite were captured on Jan. 3, 1942. Jap. landings were made in Mindanao and Mindoro on March 7, and in Cebu on April 11. Most of the Philippines had been conquered by May, though Corregidor still held out for a brief space under Gen. Wainwright. Organised resistance by the U.S.-Filipino armed forces on the Bataan Peninsula came to an end by April 9. Much credit must be given to the defence for the maintenance of their positions for over four months against vastly superior forces. Approximately 200,000 Jap. troops were employed against a defending army of some 38,000. Weight of numbers, however, was not the sole cause of the Jap. success. Japan was operating in close proximity to her main bases of supply and could therefore provide a constant stream of food, armaments, and equipment to ensure continuity of effort on the land. But the U.S.-Filipino defence was by no means in vain. It had succeeded in containing a huge Jap. army which might have been effectively employed in other theatres of war; a proportion of the Jap. fleet and a large number of valuable transports had been immobilised for four months; the struggle had cost a great many Jap. lives and made a severe drain on Jap. resources of material; and, finally, the U.S.A. had been given time to recover from the shocks of the lightning attacks on her bases in Hawaii and elsewhere and to take steps to organise her forces for a continuation of the struggle.

In the E. Indies the Jap. landed in Brit. Borneo on Dec. 16 and occupied Tarakan a week later. Then followed landings in Celebes and Amboyna, and heavy air raids on Surabaya, Palembang, Kupang, and Banka. The Dutch authorities, however, destroyed many of the oil wells at Palembang before leaving the place. Bali was invaded in mid Feb., and both that Is. and Banka were seized soon after-

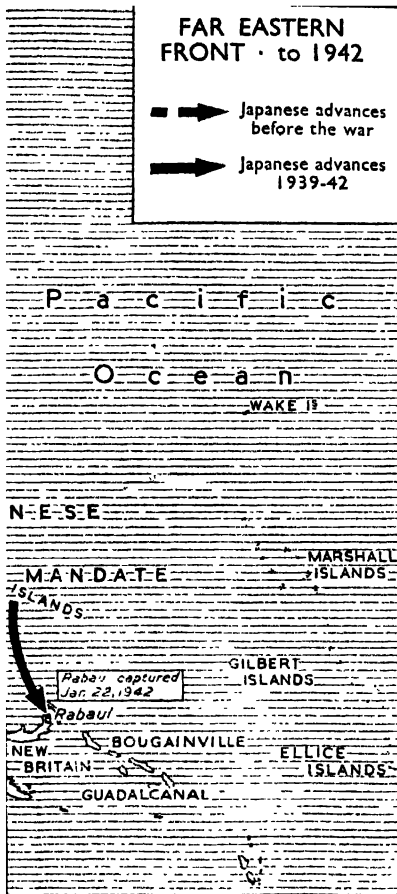
wards. The Jap. then advanced on Java, captured Batavia, pierced the Dutch defences at Bandoeng and completed the conquest of the Dutch E. Indies by mid March. Hong Kong succeeded in holding out for only a little over a fortnight (for details see HONG KONG). The earliest Jap. landings in Brit. Malaya took place on Dec. 8 in Kedah, when there were raids on Penang and Singapore. This campaign ended by Feb. 15, the whole of Brit. Malaya being conquered in the space of ten weeks (see MALAYA, BRITISH, JAPANESE INVASION OF, 1941-42). Sarawak was not in a position to resist for long, and the Brit. garrison was withdrawn to witch Borneo which itself soon fell. In Thailand the Allies made numerous air attacks on Bangkok, Singgora, Sungal, and Patana, while the Chinese forces invaded the N. part of the country with the aim of joining forces with their allies. The threat to Australia came first with the bombing of Rabaul in the mandated ter. of New Guinea (Jan. 10), followed by invasion shortly afterwards. Rabaul was seized on Jan. 22. Then came numerous Jap. air raids on Port Moresby, an important Australian base in New Guinea. In Burma Jap. air attacks were first made on Rangoon and Moulmein on Jan. 19, the surrender of Slim giving their forces an immense advantage over the Brit. defences. Moulmein was evacuated at the end of Jan. and the important tr. of Moulmein on the Salween R., 10 m. distant from Moulmein was occupied on Feb. 11. Then followed heavy fighting on the Bhamo and Sittang Rs., the chief forces on the Brit. side comprising Indian troops, notably Gurkhas, and their Chinese allies, who took up positions on the intractable and shifting fronts. Rangoon was evacuated on March 8. For operations in Burma see BURMA, SECOND WORLD WAR CAMPAIGNS IN.

Southern Pacific Campaign, 1942-43. During the first six months of the war against Japan allied naval losses had also been severe and included two aircraft carriers, eleven cruisers, twenty-two destroyers, and five submarines. Early in April strong Jap. forces had even raided into the bay of Bengal where they sank the Brit. aircraft carrier *Hermes* and two heavy cruisers, but ten days later had their first taste of what they were to suffer later when aircraft from the U.S. carrier *Hornet* raided Tokyo. The Jap. advance, nevertheless, continued, and on June 1 Jap. midget submarines actually penetrated Sydney harbour. But five days later Jap. forces received their first real check at the battle of Midway Is., when four of their latest carriers were destroyed, in addition to a heavy cruiser, and they also lost 253 aircraft and 3,500 men. The U.S. losses were one aircraft carrier, 150 aircraft, and 307 men. After this the Jap. reorganised their forces and, for in the mid year, again began to assume the offensive in the S. Pacific. Their jungle troops broke over the serrated crest of the Owen Stanley Mts. in New Guinea and began to push towards Port Moresby. They also sent



forces to occupy some of the Gilbert Is. and began to build an airfield on Guadalcanal (g.v.) in the S. Solomon Is. But suddenly, on Aug. 7, the whole aspect of the Pacific warfare underwent a change, when Amer. task forces, with the support of shock troops, seized Tulagi Is. in the Brit. Solomons, and a beach-head, which included the almost-completed enemy airfield on Guadalcanal. There was, however, a strong enemy reaction to this necessarily somewhat hastily planned manoeuvre. On the night of Aug. 8-9 a Jap. cruiser div. and destroyers surprised the Amer. ships and sank three Amer. heavy cruisers and one Australian cruiser without much loss to themselves. Thus the supply problem for the Amer.

marines who had been landed in the S. Solomons became serious, especially as the Jap., landing men at night on Guadalcanal, now began a campaign of attrition. Yet every attempt made by the enemy in August to recover his lost positions in the Solomons resulted in the annihilation or capture by U.S. marines of all the enemy troops that had been landed, and Amer. forces had now well established their positions in the Guadalcanal and Tulagi area. Not until Feb. 9, 1943, did organised resistance end in the Is. of Guadalcanal, Tulagi, Gavatu, Tananibogo, Makambo, and on parts of Florida. Against tenacious resistance, every sort of fire, and also dynamite was used. Few Jap. surrendered. At the end of Aug. the



Solomon Is. would be largely counteracted if their forces were driven out of New Guinea. By retaking the Solomons they checked a threat to the sea communications between the U.S.A. and Australia, besides securing a possible base for future operations. The continued possession of New Guinea, and particularly of Port Moresby on its S. side, was essential to the defence of N. Australia. Australian opinion had naturally been apprehensive from the day in the previous March when the enemy had seized Lae and Salamaua on the N. coast, and later Buna, from which there was a track southwards direct to Port Moresby. The Jap. troops landed at Buna, advanced and occupied Kokoda and its small aerodrome, on the N. slopes of the Owen Stanley range and, in the early days of Sept., were steadily climbing towards the pass 7500 ft. above sea level in the mt. range which constitutes the real defence line of Port Moresby. The formidable Jap. advance across the range had surged southwards through the jungle to within 30 m. of Port Moresby when it was abruptly swung back into a precipitate retreat. Fighting in some of the worst terrain in the world, covered with dense jungle, the Australians gallantly saved the greatest threat of all to their homeland. The chief contributory factors in this were the effective bombing of Jap. supply lines and the Jap. defeats in the Solomons, and also the outflanking part played by Amer. ground forces flown in haste to New Guinea. The Jap. had now been driven back to the N. down-slope of the Owen Stanley range and were fighting desperately to retain their foothold near Buna on the N. coast. Great changes had taken place in the few months previous to the time (Nov.) when the Allies were pressing on towards Buna, the main Jap. base on the N. Papuan coast. Improved trails through the jungle, roads, and airfields had now been made so as to enable the forces to operate effectively outside the Moresby perimeter and so check, if possible, the enemy control of the sea lanes N. of Australia, which was almost as strong as his command of the air.

The position in the Solomons, however, had slightly deteriorated in Sept. and Oct., when the enemy began a heavy attack by land, sea, and air. But in the large-scale naval fight between surface vessels off Savo Is. between Guadalcanal and Florida the Jap. were successfully repelled in this, their strongest bid to recapture the S. Solomon Is. (see NAVAL OPERATIONS IN SECOND WORLD WAR). Except for losses of warships on either side the situation, broadly, had remained unchanged since the previous Aug., after the Amers. had seized Tulagi and the new airfield on Guadalcanal. But the Jap. held Bougainville, the northernmost of the group, in some force with airfields and anchorages, and they had anchorages in most of the intermediate is., such as Shortland and the New Georgia group. But Guadalcanal and Florida, with the harbour of Tulagi, remained firmly in the grip of the Allies, and the seizure of these two key

Jap. entered Milne Bay, New Guinea, with some light reinforcements, but mainly with the aim of evacuating their invading troops. Their escorts were eight destroyers and one cruiser; but very soon Australian combat troops, supported by Amer. and Australian air units, threw them back with heavy losses into the narrow confines of the peninsula N. of the bay, where large numbers were destroyed and all their heavy equipment, including tanks, was lost.

The collapse of the Jap. attempt to take Milne Bay was the first serious reverse which their land forces had suffered in the New Guinea area. It was realised by the allied command that the effect of the recapture of the above-mentioned

positions had disrupted the whole Jap. plan of campaign. Whether or not the Jap. planned to invade Australia at that stage, they certainly aimed at dominating the approaches to it and cutting the supply lines to it from the U.S.A., and with that object in view they had been methodically extending their occupations to the south-eastward, occupying is. after is. in that direction and establishing at intervals airfields whence their air forces could operate in conjunction with warships, in controlling sea traffic and exercising command of the whole area. The Amer. coup in Aug. had resulted in a race between the two opposed commands to strengthen their forces, the Jap. so as to regain control over the S. is. of the Solomons, the Amers. in order to repel them and to acquire a permanent point d'appui for subsequent operations northward. Towards the end of Oct. the Jap. pierced the Amer. lines S. of the airfield of Guadalcanal but were thrown back again. About the same time the Amers. hit a Jap. battleship and three cruisers and sank some destroyers. But a much heavier naval action was fought in the Solomons area between Nov. 13 and 15 when the Jap. suffered severe losses: two battleships, one heavy cruiser, three destroyers, and six transports, besides having two heavy cruisers, one light cruiser, six destroyers, and four cargo transports damaged; the Amer. losses being two light cruisers and seven destroyers (see under NAVAL OPERATIONS). This action marked the conclusion of by far the strongest Jap. attempt to recapture Guadalcanal, and it was very completely frustrated by the aggressive action of Vice-Adm. Halsey in the S. Pacific area. This action enabled the Allies to threaten the enemy position in New Guinea and their advance on Buna on the N. coast now developed under MacArthur. The Jap., as noted above, were driven back to the N. slope of the Owen Stanley range and were now fighting desperately to keep their foothold near Buna. Allied troops occupied Buna on Jan. 2, 1943, after especially bitter fighting. But though the Papuan campaign was now ended, there remained in New Guinea heavy tasks against a formidable foe. The Jap. garrison at Sanananda near Buna was not yet overcome, and the enemy was also entrenched at various other points near the coast from Amboga to Madang. Further, though the work of the allied air force was improving, it had not prevented the Jap. from sending reinforcements into Lae, Salamaua, Finschhafen, and Madang. There was no short cut to victory here. But the Allies had learned many useful lessons: e.g. that tanks could play an important part in terrain utterly unlike the desert; that armies of native carriers provided a solution of many transport difficulties; that roads could be paved with a corduroy of saplings on which jeeps could operate. All branches of the forces had acquired experience which augured well for any future operations in S. Asia.

In the course of the first six weeks of 1943 Jap. resistance in Papua, on Guadal-

canal, and in the Solomons was brought to an end, but from that time until July the Allies stood on the defensive in this area of the Pacific, checking severe Jap. counter-offensives. At the same time the ascendancy won by their air forces prevented any further aggressive enemy movement by sea. But there were no signs of decreasing Jap. strength at any point, and the prin. Jap. bases in N. Britain (a long is. lying off the N. coast of New Guinea) showed no sign of diminution in aircraft, shipping, or troops. Japan, although at the fullest reach of her arm, hung on grimly and the situation could only be altered with any reasonable speed by another allied offensive. This offensive began at the end of June under Gen. MacArthur. The Allies seized Rendova, an is. 5 m. S. of New Georgia. On New Georgia itself a landing was made without opposition. Viru harbour was taken, but stiff resistance began when the Allies approached the Jap. chief base in the central Solomons at Munda, on New Georgia. In New Guinea a fresh landing was made in Nassau Bay, where Australian and Amer. forces joined hands close to Salamaua. Simultaneously the Trobriand and Woodlark is. groups, which had never been in Jap. hands, were occupied, thus bringing the Amers. within relatively close air range of New Guinea. The port of Rabaul, which had been the Jap. advanced base in the Pacific since Jan. 1942, was the palpable objective of the Allies, but the struggle for it was likely to be hard. Long-range guns put ashore at Rendova islet were now shelling Munda airfield, only 5 m. distant. A naval action in the Kula Gulf near New Georgia resulted in the loss of an Amer. light cruiser and a destroyer, but the Jap. also lost a number of warships. Between July 6 and 17 the Jap. lost six warships, and their naval position in the 'S. seas' was certainly becoming strained. But though Munda at length fell on Aug. 6, with the wiping out of 1671 of the garrison of 5000 men, and 1900 Jap. soldiers were killed or captured on Aug. 17 when allied ships intercepted Jap. barges and a destroyer escort in Vella Gulf, the whole converging movement on Rabaul, begun late in June, made but slow progress. The attack in New Guinea had come to a standstill and, after the fall of Munda, the Jap. dug themselves in on Balroka, with reinforcements. The Allies were in fact struggling in a vile country, thick jungles, dense thickets, and gullies, against carefully entrenched enemy positions. The scale of the original operation had to be modified. Is.-hopping was proving expensive and dilatory. The factor compensating for the slowness and costliness of the land fighting, however, was the scale of Jap. losses in the air and on sea. Thus, on July 17, 200 Amer. aircraft in the N. Solomons sank seven Jap. ships and destroyed forty-nine planes for the loss of only six Amer. aircraft. This fact was significant not merely for the fighting in the Solomons area, but for the whole 'co-prosperity' (see NEW ORDER) sphere which Japan had to patrol and supply.

A strong force of U.S. and Canadian troops, supported by naval vessels, occupied Kiska in the Aleutians after landings which began on Aug. 15. No Jap. troops were found there as they had abandoned the is. under cover of fog, their positions being untenable after the occupation of Attu. Gen. MacArthur, in a combined operation in New Guinea, brought off a notable success in effecting a strong landing near Lae, the result of which was to draw a ring round the powerful Jap. bases there and at Salamaua. The Jap., despite the continual bombing of the base, which lies at the head of Huon Bay, did not suspect that a land attack would follow and they were taken by surprise when an Australian force was put ashore (Sept. 4) to the N.E. of Lae, thereby cutting it off from Finisshafen at the mouth of the bay. The next day Amer. paratroops were dropped in the Markham valley behind Lae, where they were joined by Australians who had covered over 50 m. through jungle and swamp from the Salamaua area to meet them, a remarkable feat of endurance involving a forced march of five days. The expeditionary force was protected by a strong screen of Amer. warships as well as aircraft, and prior to the actual landing the ships went close inshore and fired hundreds of shells into the jungle fringing the beaches. Heavy raids on the night of Sept. 3 had temporarily neutralised the Jap. bases on Wewak, Madang, and Rabaul. Jap. aeroplanes were seen and their navy did not try to intervene. The pressure exercised previously by Amer. and Australian ground forces on Salamaua had so completely diverted Jap. attention to the battlefield E. of Lae that the landing troops poured ashore without hearing a single shot and Lae fell to allied forces on Sept. 10. The absence of the Jap. Navy was probably explained by its losses in the series of actions which began at Guadalcanal in Aug. 1942; for, though it was still formidable in battleship strength, these require the support of large numbers of aircraft-carriers, cruisers, and destroyers to be able to bring full weight to bear in modern warfare. Lae was an important victory because it was from this base, with its good anchorage, its airfields, and its coastal connections running to E. and W., that the Jap. directed the defence by land and air of their chain of strongholds which at one time stretched as far as Buna and Gona. Salamaua fell to Gen. MacArthur a few days after the landing near Lae. Salamaua had been held by the Jap. since March 7, 1942. Its capture by the Allies was a triumph over natural obstacles in the shape of high cliffs and gorges, an almost impenetrable jungle country, and strongly prepared positions on precipitous spurs and knolls. From these, however, the Jap. were now in retreat, leaving hundreds of dead and much equipment, allied losses being light. When on Sept. 16 the Allies entered Lae itself they found a scene of utter desolation. It was evident too that the Jap., since their occupation (March 17, 1942), had built but few roads

or bridges. Demoralisation had set in with the garrison and no longer did they fight fanatically to the last man. Many had retreated into the jungle. Soon after, the Jap. were turned out of Finisshafen by Gen. Blamey, the Australian commander, after making a daring landing in the enemy's rear and some eleven days of fighting. Australian artillery played an important part in these operations, which also included a second landing behind Lae. But the pivotal place remained, as always, Rabaul in New Britain. With the hope of at least temporarily neutralising it, a very heavy air attack was launched by the Allies on Oct. 12. One hundred Jap. planes on the ground were destroyed and 50 per cent of the air strength of Rabaul was lost to the Jap. Three destroyers, two medium-sized merchant ships, forty-three small sea-going vessels, and seventy harbour craft were sunk. The Jap. made what seemed to be a strong counter-offensive against Finisshafen, having landed barge-borne troops between that place and Madang. They were too late to relieve Finisshafen, but succeeded in escaping notice in the dense jungle and among the rocks of the Sattelberg range, where they were joined by remnants of the garrison and now offered a stiff resistance to Australian patrols. On Oct. 21 they broke cover in strength and took a vil. near Finisshafen, but though supported by air strength they were thrown back into the Sattelberg. Bougainville Is. was at this time the only Jap. stronghold barring the Allies' way from the central Solomons to Rabaul. There was a second raid on Jap. shipping there on Nov. 2. To forestall a probable Jap. counter-attack on the beach-head estab. by the Amer. at Empress Augusta Bay on Bougainville, where the previous night the Amer. had sunk a Jap. cruiser and two destroyers, besides damaging two heavy cruisers, the Amer. carrier-based aircraft from the *Saratoga* and *Princeton* attacked Rabaul and practically swept the harbour clean, nearly every ship in it being heavily hit or sunk by 1000-lb. bombs. Among these were sev. warships. In addition the Jap. lost over eighty aircraft in an air encounter over the harbour. The Amer. losing nine bombers and ten fighters. The Amer. had previously observed some fifty-three warships (cruisers, destroyers, and light craft) escorting eleven transports, the number of warships sighted giving evidence of the importance attached by the Jap. high command to the operation. These ships and their convoy had left the base of Truk in the Caroline Is., but were spotted by long-range Amer. aircraft, with the result that when the ships approached Rabaul they were the targets of fierce Amer. air attacks for some days from Nov. 2, both at Rabaul (as shown above) and at Kavieng (New Ireland) and out at sea. Sev. heavy cruisers were hit and one blew up, and five others were either lost or completely disabled, apart from many other craft and a multitude of planes.

A substantial improvement of the

Allies' position in the S. Pacific was effected by the capture on Nov. 20 of the Gilbert Is. (a Brit. colonial dependency) after a short and remarkably successful Amer. combined operation. The recapture of the airfields and harbourage of the is. was calculated appreciably to extend the effective range of allied action in the Pacific and, correspondingly, to increase greatly the strain on Japan's naval position, besides bringing nearer the fulfilment of the hope of menacing the big Jap. base at Truk and of the positions in their mandated areas, the Caroline and Marshall Is. Yet perhaps the more immediately important consequence of the capture of the Gilbert Is. was the evidence it afforded of the Allies' growing naval strength in the Pacific. The capture of Ijeto within the Tarawa atoll by U.S. marines was a gallant exploit under heavy fire and amid a dangerous and complicated conformation of coral reefs through which the men waded in three feet of water, often for half a mile or more. Their losses were grievous, especially as the Jap. garrison of 4000 picked troops on the Gilberts fought with fanatical courage, and with more skill than their fellow countrymen displayed in their none the less obstinate resistance to the Australians in the jungles, swamps, and forest-clad Sattelberg position near Finsehafen, which place was captured by the Australians about this time.

The battle of New Britain began in mid December, when contingents of the Sixth Amer. Army landed on the S. coast of the is. between Gasmata and Cape Gloucester. Their main assault on Cape Merkus was unopposed, but a subsidiary attempt elsewhere met with a severe repulse. The failure of any Jap. warships and of all but a small fraction of the strong Jap. Air Force in the is. to appear, was perhaps to be expected in view of the fact that the naval forces, Amer. and Australian, which covered the landing were the largest that had yet appeared in this part of the Pacific. But the great and increasing activity of the Amer. bomber squadrons over the aerodromes and harbours of New Britain was no doubt the chief cause of the Jap. loss of the initiative by sea and air which was noticeable at Lae, again in the capture of the Gilbert and Marshall Is., and now again in New Britain. The end of the year, however, found the Jap. still firmly installed in the Ramu valley and on Huon Peninsula in New Guinea, and still holding Madang there, while in New Britain the Amers. near Cape Gloucester were meeting with stiff resistance.

It is evident that throughout the period from the early Jap. conquests in the Pacific down to the sinking of the Bismarck Sea convoy on March 3-4, 1943, and even later in the year, the initiative rested mostly with Japan. The Allies, however, took the initiative in occupying the S. Solomons (Aug. 1942), and again in the limited counter-offensive which F.-M. Wavell's forces began in W. Burma in mid Dec. 1942. The allied victories in the battles of the Coral Sea (May 4-8,

1942), Midway (June 4), the Solomons Sea (Nov. 13-15), the Bismarck Sea (March 3-4, 1943), the Papuan campaign (Aug.-Nov. 1942), the action in Milne Bay (Aug. 31), and at Wau (Jan. 30, 1943) were all essentially defensive victories in which the Allies thwarted the designs of the enemy and resisted further aggressive moves on his part. Jap. success in the first six months of the war was of so sweeping a character that the Allies could not hope to recover until preparations on the largest scale were completed, and indeed it seemed that the initiative must remain with the Jap. until Germany was defeated, so as to relieve a great weight of sea and air power for concentration in the Pacific. Japan had, in the early months, occupied the richest colonial area in the world and thereby secured unrestricted access to the raw materials, the lack of which had been the great weakness in her economy. Her success was only in part due to the fact that she had attacked when Russia was pre-occupied elsewhere and when America was still unprepared, even psychologically, for war at all. Other factors which contributed to Japan's success were the utter inadequacy of the defences of the E. possessions of the W. powers (even the conception of the Singapore base was technically unsound), and the fact that they underestimated the quality of the Jap. armed forces and Jap. powers of strategy, and also the disparity in lines of communications. Thus all those areas which Japan had coveted as essential units of her 'co-prosperity' sphere were conquered with but slight loss and in less than six months. Yet, curiously enough, the Jap. then seemed to falter. The enemy had occupied Burma and yet did not proceed to the invasion of India, and the probable explanation of this hesitancy was that the speedy progress of her forces had strained her lines of communication. At all events the Jap. then directed their efforts southward, in the direction of the Solomons and New Guinea, apparently for seizure as stepping-stones to the occupation of Australia and New Zealand. But they sustained an unqualified defeat in Milne Bay and again in the major naval engagement off Guadalcanal (Nov. 13-15, 1942), while in Papua the Australians had checked their hazardous overland advance on Port Moresby, the Owen Stanley range proving to be too formidable a natural obstacle for their troops. But they stabilised their positions at Gona, Sanananda, and Buna, and so compelled the Allies to begin long siege operations against all three. After being expelled from these points their forces, operating from Mubo, S. of Salamaua, tried to take Wau, the main allied base in the goldfields area in N.E. New Guinea, their chief objective being the strategic airfield there, but they were foiled. In all this difficult period of the Allies' ordeal the severest strain was that imposed by the Papuan campaign, which involved dour and bitter fighting in which no quarter was given and none expected. Only the toughest troops were of any avail in such a campaign, but the

splendid battalions of the Australian Imperial Force with a long campaign of stiff fighting in the Middle East behind them were more than a match for the Japanese soldiers, whose fanaticism made up for their overestimated capabilities in other respects. The arduous nature of the New Guinea campaign was aggravated by the conditions of living: heavy rains and chilly nights on the mts., scarcity of food, uncertain communications, shortage of food, dysentery, and scrub itch, all of which called for great courage and endurance.

Whether or not Japan could be defeated by taking the war into China was very doubtful. Some believed that if the Allies could get sufficient supplies into China to enable them to establish air bases from which to bomb Japan itself the war would soon be won. But Japan is essentially a maritime power and no establishment of bases on the Chinese mainland could by itself defeat such a power any more than Britain was defeated when, after mid 1910, the Germans controlled all the nearby mainland of Europe. The chief munition base, as



Imperial War Museum (Crown copyright)

LANDING OF U.S. REINFORCEMENTS AT GUADALCANAAL, MOTOYON ISLANDS.
In the circle are three Japanese planes. Helicopter much bombed and heavily shelled.
is in the upper left corner of the picture.

and strong nerves. The air arm played a great part in the Papuan campaign. The machines which bombed the Japs at Kokoda were perhaps the dominating factor in forcing them out of forlorn near Port Moresby. But more than all the Papuan campaign established the interdependence of land, sea and air. Swift efficient co-ordination in the use of all arms marked the early Jap successes and demonstrated to the Allies that only a tremendous development of air and sea power, either alone or in co-operation with land forces operating either from Burma so as to reach the China coast, or from Australia, or from both, could be expected to achieve the task of expelling the enemy from his numerous consolidated positions in the S. Pacific, in Burma, and in S. E. Asia.

well as the man power of Japan is in her home islands and in any case Japan is much further from the Chinese mainland than is Britain from the European mainland. Moreover most of Japan's coal and oil, mineral oil, and raw material came from abroad and therefore the one obvious way to defeat her was to cut off command of the Jap seas. That alone would make it possible for the Allies to blockade the country and to construct airfields on small islands within a range from which to maintain constant air attack on Japan's home bases and so gradually to cut off reinforcements and supplies from the Jap armies on the Chinese mainland and elsewhere. Thus the vital war against Japan was the war at sea and the advances being made into Jap-controlled seas and the whittling down of Japan's sea power

by the destruction of both warships and merchant ships were bringing nearer the day when the Jap. fleet must emerge and try to repel the allied fleets. The longer Japan postponed this decisive action the greater grew the odds against it.

By the beginning of 1944 the initiative on and above the seas and among the multitudinous is. was entirely in the hands of the Allies. Off the New Georgian Is. group and Bougainville an occasional Jap. light cruiser and a few destroyers had taken the place of the battleships, aircraft-carriers, and heavy cruisers which more than once had challenged the Amer. squadrons off Guadalcanal. On the ground, too, the balance was against the Jap., the Amers. and Australians being now their equals in the arts of jungle warfare. Of the Jap. garrisons previously located among the Solomons only a few troops remained, marooned on Choiseul, and the garrison of Bougainville. In New Britain itself, apart from the strong Rabaul garrison, the Jap. troops were in occupation of a number of ports, which could only communicate with each other by sea, the is. being as dense with jungle and as trackless as New Guinea. From the Jap. failure to intervene in the defence of the Gilbert Is. or to attack the escorts of the expeditionary forces disembarked on New Britain or on the N. coast of New Guinea, it was evident that their offensive strength at sea had been so impaired by their losses of aircraft-carriers, cruisers, and destroyers that they had resigned the initiative and were condemned to a naval defensive of diminishing strength. Also, since the development of the allied counter-offensive, the Jap. mercantile marine had been subjected to almost daily air attack, and Amer. airmen and their Chinese allies had begun to strike hard at its vessels in S. Chinese and Indo-Chinese ports; Brit. and Amer. aircraft were making the Singapore-Rangoon route perilous; and all over the W. Pacific from the Jap. coasts to the E. Indies it was being subjected to relentless attrition by Amer. submarines. The allied successes did not of course presage a speedy termination of the Pacific campaign, nor mark the end of 'island-hopping,' since the seizure of is. air-bases was a necessary condition of the allied advance either in this theatre or further W.; but they revealed the ability of the Allies to hold and to exploit the initiative which their sea power had regained.

Attacks on Marshall and Caroline Islands; Paramushir, Kuriles, Northern Pacific.—Powerful Amer. air forces, land-based and carrier-borne, were sent by Adm. Nimitz, at the end of Jan. 1944, to attack Jap. bases in the Marshalls. Very strong attacks were made on Kwajalein atoll, Roi, and Makelap in the central Marshalls; while battleships and light surface units also bombarded the same objectives. Amphibious forces then landed in the Roi and Kwajalein areas and estab. beach-heads near the enemy bases. Strong F.M. action was encountered, but Namur in mid-Jon captured, and of the Kwajalein the bath of 2000 some 1250 were slain for

nominal Amer. losses (Feb. 2). On Feb. 4, by bright moonlight, an Amer. fleet under Rear-Adm. W. D. Baker poured hundreds of tons of shells into Paramushir, in the Kuriles, the prin. Jap. naval and air base in the N. Pacific. The naval bombardment was followed by a bombing attack by naval aircraft, the Jap. being taken by surprise and evidently demoralised. When the fleet began to shell them, the Jap. fired wildly along their own beaches and at the ocean and at the sea of Okhotsk. These operations marked the first attack of the war on Jap. home ter., apart from the Amer. air raid on Tokyo early in the war. In the seven days' fighting (Feb. 2-8) in the Marshalls, 8122 Jap. were killed for 286 Amers. On Feb. 16 strong Amer. task forces of hundreds of aeroplanes by daylight attacked Truk, the great Jap. naval base in the heart of the Carolines. Truk is a very large atoll, 30 m. across, but, unlike Kwajalein, which is low and sandy, the lagoon of Truk contains a number of mountainous is., running up to 1500 ft., being extinct volcanoes of basalt. Not much was known about the works the Jap. had constructed there, in defiance of mandatory prohibitions, though doubtless the U.S. naval authorities had learned much from air reconnaissance. The rocky is. of Truk, lying well inside the ring of the reef and unapproachable without penetrating the lagoon, lent themselves far more to a stubborn defence than did the sandy is. of the Marshalls. Towards the end of March the U.S. Pacific Fleet made heavy attacks on the Jap.-held Palau Is., some 550 m. E. of the Philippines. The attacking force included aircraft carriers and battleships and the attacks were co-ordinated with other attacks made by bombers on the Carolines. In these attacks twenty-five Jap. ships, including two destroyers, were sunk, and 200 aircraft destroyed.

New Guinea Landings.—Early in the New Guinea campaign small garrisons of Dutch E. Indian troops manned isolated outposts in Dutch New Guinea, supported by small detachments of Amers. Towards the end of March Australian troops were landed, strategic considerations demanding that these outposts, which guarded the approaches through Torres Strait to Port Moresby and Darwin, should be consolidated. This part of New Guinea has a central mt. barrier even more formidable than the Owen Stanley range and no white man has ever crossed it. The coastal region is a large swamp covering tens of thousands of square miles, intersected by countless streams and creeks infested by crocodiles. The Australians had to wade waist-deep through mud with lanterns to guide the barges into narrow channels, and rifles were fired to frighten away the hundreds of crocodiles. A month later allied forces landed at three different points in N.E. New Guinea, capturing the Humboldt Bay region and Hollandia. This move was a spectacular development in the long-range plan designed to free New Guinea from Jap. control. The operation involved the biggest assembly



Australian News Information Bureau

AUSTRALIAN TROOPS IN NEW GUINEA

Members of an Australian infantry battalion in their positions at Green Snipers Limple, Shaggy Ridge. The capture of this point gave the Australians a feature which dominated the Japanese line of communication and opened the way to Bojadjim.

of air, sea, and land forces yet seen in the S W Pacific including a formidable air craft carrier force which kept watch for possible enemy interference which might come from the air. By the end of May the end was in sight for the Jap in New Guinea. Strong isolated centres of resistance survived in the coastline between Alexishafen and Hollandia but they were a diminishing quantity. The sea power of the Allies was unchallenged in a circle radiating from their powerful New Guinea bases. MacArthur's forces were steadily edging westwards. Land operations in the S W Pacific for months past were less a war of combat than a war of supply and quick construction. Hollandia, like other selected spots, was attacked from the air, and convoys with strong naval support took in troops and much equipment for the capture and reconstruction of strategic

airfields. No considerable opposing force was met in these months and no great retaliation from the enemy. Hollandia would probably have been the last big delivering base the Jap would have used in New Guinea had not the unexpected arrival of allied forces forestalled them. Remarkable work was done by the Americans on this newly recovered ground. It was well suited to spanning the gap of ocean and is between allied ter in the Pacific and Japan. It was an engineering expedition rather than a plan of battle. Moreover by expending the maximum in explosives ammunition, and supplies, the Americans conserved the lives of their soldiers. They realised that it did not pay to risk man power to attain an objective that could be won as easily with arms or machinery. Thus highways were carved out of mts or thrown across sago swamps as occasion required, huge bulldozers forced their way through kapok plantations and diverted rivers. Amphibious craft plied from ship to shore in the rush to bring up supplies. Air strips were laid down swiftly and having served their brief purpose were discarded. Possession of advanced fields enabled bombers and fighters to be over enemy ter at all hours and all the nearer enemy fields had now come under persistent Amer and Australian bombing. At night patrolling torpedo boats were destroying all surface craft they could find. Indians and Japanese who had been forced into slave labour and tortured and flogged by the Jap were eager to co-operate with the Amer Army and the Dutch civil administration now set up at Hollandia. Doomed and desolate at the other end of New Guinea stood Rabaul a monument to the art of encirclement in war. It was now a target for allied bombers whenever they chose to attack it.

Invasion and Capture of Saipan. Guam retaken.—The next important operation was that of the Amer expeditionary force on Saipan. In June 15, most important of the Marianas 1500 m S of Japan. This bold Amer action was a direct challenge to the enemy in a vital area for the loss of Saipan would threaten the inner ring of Japan's conquests and her communications through the China Sea. Unwilling to risk her main fleet Japan tried a surprise attack on the U.S. Fifth Pacific Fleet which together with British naval units was engaged in protecting the forces invading Saipan. The Amer commander, however, was well informed about the enemy's manoeuvres and was ready to bring the enemy fleet to battle if possible. His latter consisted of five or six aircraft carriers with a escort of four battleships of the second line *Kongo* class and a number of cruisers and destroyers. But, discouraged by the fact that the Amer carrier force on June 19 had shot down a large number of Jap aircraft off Saipan, the Jap commander decided not to risk a naval engagement. On the evening of the next day however an attack on his fleet was made by Amer aircraft and naval units which bombed and sank three carriers, one battleship, a

destroyer, and smaller vessels, there being no loss of ships on the Amer. side, although slight damage was sustained by two Amer. carriers and one battleship. In these engagements the Amers. lost 110 aircraft as against 335 Jap. Saipan was now virtually lost to the enemy. Originally it had a Jap. garrison of 20,000, in an area of 70 sq. mi. Of that garrison 19,000 died fighting. Amer. casualties were correspondingly heavy, 15,000, of whom 2359 were killed and 1213 missing. This was by far the biggest-scale fighting in the is., as also the most ferocious. It was found that there remained at least 45,000 Jap. in the Wewak-Aitape area of New Guinea and there were signs that they too, cut off by allied sea-power, would, like the Saipan garrison, fight to the last. But the Saipan victory proved that the Allies were on the right road and the success of the landing force showed that there was no lack of guns and tanks. That Adm. Nimitz was able to send so far a force so strong and well-equipped was proof alike of the Allies' supremacy at sea and of the great number of soldiers they could spare, even at a time when the Pacific was, perforce, still regarded as an operation secondary to the war in Europe. The gradual, if slow, approach of allied arms to Japan proper was marked on the night of July 9, when Amer. Superfortresses attacked the Jap. mainland for the second time within a month, bombing installations at the great naval base of Sasebo, on Kyushu Is., and industrial objectives at Yawata, 65 m. further E. on the same is. Yawata, with the largest steel works in Japan, was the target for the earlier raid on June 15. The loss of Saipan precipitated a political crisis in Japan, for Gen. Tojo ceased to be Prime Minister, a new ministry being formed under an admiral and a general. Added to the loss of Saipan was the knowledge of the military and naval chiefs that utter disaster threatened Japan in the S. seas, and in that 'co-prosperity' sphere which Japan had marked out as her own. Defeat in Burma, where the much-publicised invasion of India had proved a costly failure; the mounting losses of the Jap. mercantile marine (Brit. submarines at this time sank over a score of Jap. supply vessels, besides damaging others); the impotence of the navy to rescue, reinforce, or even revictual the starving and fever-stricken armies marooned in New Guinea and other Pacific is.—these were the fruits of Gen. Tojo's stewardship. It remained to be seen whether his successors could wrest victory from failure; but they could have no very good hope of extricating Japan from the plight into which Tojo had led her by his policy of dispersing Jap. strength over a multitude of is. which failing sea-power could not defend. On July 31 an Amer. expeditionary force of marines and infantry invaded the much-battered and important is. of Guam, which had fallen to the Jap. on Dec. 12, 1941, and which is the southernmost and largest of the Marianas, 130 m. S. of Saipan. The invading force went ashore

under cover of a heavy bombardment from carrier aircraft and warships of the Fifth Fleet and estab. beach-heads at all predetermined points. The preliminary bombardment by ships and aircraft was the longest theretofore of the Pacific war; it began, appropriately enough, on Amer. Independence Day, July 4 (for Guam was the first of America's dependencies to be taken by the Jap.), and lasted seventeen days. Its importance to Japan lay in the fact that it covered her supply line through Burma and the Dutch E. Indies. Amer. tanks were landed within four hours of the attack on July 21. The struggle, however, promised to be a hard one, comparable to the fighting in Guadalcanal, for like that is. Guam is remarkable for its broken hills, steep valleys, and jungles. But by Aug. 7 the Amers. had buried more than 8000 Jap. dead. The sole area remaining to the Jap. on Aug. 8 was Pati Point on the E. coast, but on Aug. 10 all organised resistance ceased. Jap. attempts to escape were prevented by the naval patrol maintained off the N. coasts. Isolated groups of the enemy were soon wiped out.

American Invasion of the Philippines.—The position in the S. Pacific at this time was that thousands of Jap. still remained in Brit. New Guinea, New Britain, New Ireland, and the Solomons; but all were watched by allied garrisons at well-chosen vantage-points and almost daily bombed or machine-gunned by allied airmen, besides being deprived of supplies and worn down by starvation and disease. Hence these large bodies of enemy troops were no longer a menace, though sooner or later they would have to be dealt with. The Jap. remaining in Dutch New Guinea continued to drift westwards, seeking a way of escape, but their luggers were being sunk every day by air patrols. Thus the Allies were free to develop their campaign against the Philippines. By bombing Davao the Amers. increased their growing threat to the Philippines and their pressure on the enemy air bases at Mindanao. On Sept. 15 Amer. marines and army assault forces of Adm. Nimitz's command landed in the Palau Is., Japan's nearest and strongest bastion E. of the Philippines, 550 m. away. Simultaneously Gen. MacArthur's force successfully occupied the Morotai Is., 300 m. S.E. of the Philippines. The way for both landings had been prepared by massive attacks on the central Philippines by carrier aircraft of the Pacific Fleet a few days earlier. A week later, on two consecutive days, carrier-based aircraft raided Manila for the first time, a convincing proof of the Allies' rapidly growing superiority in carriers. In this raid 357 Jap. aircraft were destroyed and 46 ships sunk or damaged, and a floating dock destroyed, the enemy being caught by surprise. By this date (Sept. 25) the U.S. Third Fleet in the far W. Pacific had sunk 122 ships (excluding 61 small craft), damaged 137 ships and 109 small craft, and destroyed 980 aircraft, Amer. losses being 51 aeroplanes and 57 airmen. These operations of the Third Fleet had forced

the Jap. to withdraw their naval forces from their former anchorages in the Philippines and seek new refuges in the same general area. Japan's sea lanes were now confined to the China Seas, the rest of the wide Pacific being dominated by the U.S. fleet, while the Jap. Navy stood off, unwilling to risk an encounter. The war-makers of Japan before 1941 evidently believed that if they could get all the known is. airfields and build a few others in the outer perimeter they would be unassailable. They omitted from their calculation the tremendous industrial potential which permitted the Amers. to go into any is. or atoll, tear down tracts of jungle, and build first-class air-strips in days or weeks. Some of the is. so used were mere coral specks which, in the war, became magnified into important airbases. Morotai was a good case in point. Heavy blows now rained down on Jap. shipping resources. The expected Amer. invasion of the Philippines began on Oct. 20 when, in a great amphibious operation, Gen. MacArthur's forces seized the E. coast of Leyte Is., 600 m. N. of Morotai and 2500 m. from Milne Bay, whence the offensive, in effect, had begun sixteen months previously. By seizing Leyte, which lies between Luzon and Mindanao, the Amers. split the Jap. forces (estimated to number 225,000, under F.-M. Count Terauchi) in the Philippines in two. Again the enemy was outwitted, for his expectation of an attack on Mindanao caused him to be caught unawares in Leyte, with the result that the Amers. pushed rapidly inland with small casualties. The landing was preceded by a devastating naval and air bombardment. Supplies of heavy equipment soon arrived in great quantities. Air support was given by navy carrier forces of the Far E. Air Force and the Royal Australian Air Force. Within ten days the Amers. had disorganized the Jap. defence of Leyte, the enemy's losses in killed and wounded being 14,400, or half their force, and also captured virtually all Samar, the is. next to Luzon. Tacloban, the cap. of Leyte, and its airfield were captured soon after the landing, as also was the airfield at Dulag, thus giving the Amers. airfields from which eventually the rest of the Philippines might be won back. Great as was the real strategic significance of the invasion of Leyte the political and moral aspects of Gen. MacArthur's return to the Philippines in Filipino eyes tended to overshadow the military aspect, for in 1942 nothing so deeply underlined the truth of Japan's initial advantage as her capture of the Philippines, despite the utmost efforts of a supremely tenacious defence. Simultaneously with the advance into Leyte the Jap. Navy sustained a very heavy defeat in the Philippine Sea, some fifty-eight Jap. warships being sunk or damaged, including the super-battleship *Musashi* of 45,000 tons (sunk), her sister ship *Yamato* (damaged), and the battleships *Fuso* and *Yamaguchi* (sunk) (for details see under NAVAL OPERATIONS). The conquest of Leyte was practically completed before

the end of the year, the Jap. losses being 82,514, including 63,801 killed, compared with 10,400 Amer. casualties, of whom 2176 were killed.

On the morning of Jan. 9, 1945, Gen. MacArthur led large forces to the invasion of Luzon. Jap. aircraft struck at the Amer. warships repeatedly and desperately, but seventy-nine of their machines, besides two destroyers and other vessels, were destroyed. In one day the Amer. forces had estab. themselves firmly on the S. shore of Lingayen Gulf, and at alight coast advanced southward towards Manila and eastward to secure strong hill positions. The invasion was one of the biggest amphibious operations of the war, over 100,000 men being landed, with their supplies, from an armada of 1000 ships, including 800 transports, and great quantities of tanks and guns. President Osmena, of the Philippine Commonwealth, issued a proclamation on Jan. 10 exhorting all Filipinos to rally to Gen. MacArthur's forces. Bombing of key-points and bridges on the railway from Manila to Lingayen, of airfields close to Manila, and of bases at Baguio and Rosario, to the N.E. of Lingayen Gulf, seriously obstructed the movement of Jap. reinforcements towards Gen. MacArthur's chosen battle-ground on the great central plain. Meanwhile Amer. carrier-borne aircraft sank twenty-five Jap. ships and damaged many more in an attack on four convoys off Indo-China between Saigon and Camranh Bay, which latter, though 800 m. from Luzon, was nearer than any other Jap. base on the mainland of Asia and was serving as a concentration point for important elements of the Jap. fleet.

Manila captured by the Americans.—The Jap. rout in Luzon was a foregone conclusion, for their local air-power and airfields had been destroyed long before Gen. MacArthur's landings and their garrison had been much depleted in a vain effort to stave off defeat in Leyte. Moreover Gen. MacArthur and his staff had closely reconnoitred the defences for two years previously with especial attention to the central plain, and his intelligence service throughout the Jap. occupation had been remarkably reliable, being supported by Filipino co-operation. Four Amer. divs. were employed at the beginning of the campaign. One held the right and two the left flanks, while the main advance was made by the 37th Infantry Div. towards Manila. Subsequently the 1st Cavalry Div. was added, and these two divs. reached the outskirts of Manila on Feb. 3. On Feb. 4 the Amer. flag was once more flying over Manila (see also MANILA). Meanwhile diversionary landings had been made in Subic Bay and on the Batangas Peninsula, while an airborne div. moved northward from Batangas to close the pincers. The whole plan was well conceived, but the Jap. so neglected their opportunities that it was never put to any severe test, and it became evident that they had lost Manila because the increasing power of the Allies had rendered a local recovery by the enemy impossible; while a further

factor in the Jap. defeat was their inability to continue normal administration. The people's resentment towards the Jap. was shown by passivity and non-collaboration and, in the case of the guerrillas, by sabotage and open rebellion. A Jap. force still held out within the walls of the old Sp. city of Manila with desperate ferocity, but it was already unlikely (Feb. 16) that the rest of the Jap. garrison could be of more than a nuisance value in the country around Baguio or further N. In W. Luzon Bataan was captured (Feb. 16) by the Amers. after landings on the S. coast, the enemy's gunfire from Corregidor being neutralised by destroyers and aircraft. Cavite naval base was taken at the same time.

Sumatra Raided.—On Jan. 24-29, 1945, two strong attacks were made by aircraft of the E. Fleet on Jap. oil refineries on Sumatra. A powerful force, commanded by Sir Philip Vian and including the carriers *Illustrious* of Malta fame, *Victorious*, *Indomitable*, and *Indefatigable*, struck a most damaging blow at the enemy's oil supplies of major importance to his war effort in this zone. These attacks were made by carrier-borne aircraft on refineries at Palembang in S. Sumatra. At the same time as this heavy blows were struck at Iwojima in the Volcano Is. by battleships and cruisers which bombarded the is. on Jan. 24.

Tokyo bombed. Invasion of Iwojima.—The first of a series of air attacks on Japan was begun on Feb. 16-17, 1945, when 1500 Amer. aircraft attacked Tokyo and Yokohama. These aircraft were launched from an immensely powerful Amer. naval force, which included a score of the fastest and largest carriers, escorted by battleships. The air attack on Tokyo under Adm. Marc Mitscher, whose force moved up to within 300 m. of the Honshu mainland, the nearest to the Jap. coast that any hostile fleet had been during the war, gave the Jap. a terrible lesson in Amer. power. The aircraft first attacked Jap. aircraft, airfields, and other targets in and around Tokyo in wave after wave for nine hours, while the sea and air bombardment of Iwojima was continued. The main weight of this great raid on Tokyo was directed against military targets rather than the industrial objectives at which the Superfortresses had aimed during the previous three months or more. Some 332 Jap. aircraft were shot out of the air, 177 definitely destroyed on the ground, and 150 probably destroyed on the first day, with an unknown number damaged on the second day; and also with much damage to naval vessels, aircraft factories, and engineering plants. The Amers. lost forty-nine aircraft and forty pilots. The Jap. found that instead of only the huge long-range bombers, formidable both for offensive and defensive powers but restricted in numbers and confined to a restricted number of bases, they now had to face attack by swarms of light and medium aircraft operating from mobile bases. The command of the sea secured by the

battles off the Visayas in Oct. 1944 had given the Amer. high command the opportunity of carrying the war to the heart of Japan when it chose. While Adm. Mitscher's task force of carriers and escorts was thus engaged, another force was in action off the Bonins, which are less than 700 sea miles from Tokyo Bay. This force under Adm. Spruance contained battleships as well as carriers, and was now bombarding and bombing the enemy's positions on the already much-bombed is. of Iwojima as a prelude to landing. Amer. marines landed on Iwojima on Feb. 19. Some 800 vessels, including battleships, took part in the attack. The invasion of Iwojima was one of the sternest tests in the hist. of America's wars and Amer. casualties were heavy, for the enemy was seasoned and expert and took every advantage of the broken, boulder-strewn terrain, and was strongly supported by artillery, mortars, rockets, and machine-guns, besides extensive minefields.

Battle for Intramuros ended.—In Manila there had been some weeks of most bitter fighting, but by Feb. 20 the Japs. had been compressed into an area of only 1200 yds. by 800 yds. in the walled city of Intramuros. Jap. casualties in the six weeks' campaign on Luzon were at this date (Feb. 20) 92,000 and the Amer. 12,929. The battle for Manila ended on Feb. 24, or three weeks after the Amers. had entered the city. Terrible sights met the eyes of those who took the city; for the Jap., by forcing civilians to remain there, had turned Intramuros into a charnel-house, where the bodies of those who died violent deaths were littered among the ruins. It was a repetition of all the barbarities the Jap. had committed since Manila was attacked, with a new kind of cruelty superadded.

The Americans in Corregidor.—Gen. MacArthur returned to Corregidor on March 2, three years after the Jap. had overpowered the exhausted Amer. garrison and he himself had flown to Australia. Its reconquest began on Feb. 18, when the first Amer. assault troops landed after a massive bombardment had silenced the great guns of the forts. The reduction of the defences was achieved with the thoroughness, patience, and skill which the Amer. Army had acquired in the capture of many a Pacific is. stronghold. Some 3000 Amer. infantry and paratroops, who carried out the attack, were opposed by double the number of Jap.; but their casualties were relatively light, while the Jap. left over 4200 dead. The battle for Luzon was now reaching its end. Amer. airborne troops having captured Malayan had reached the S. end of the is.

Further Raids on Japan.—Further air attacks were made on Japan on March 9, by which time some 15 sq. m. of Tokyo, the heart of the city's business and industrial dist., were only a blackened and smouldering ruin. In all that once densely populated area E. and W. of the Sumida R. not a building was spared in the rain of fire sent down on the city

from more than 300 Amer. Superfortresses. At the same date other Superfortresses, which had flown from bases in the Marianas, attacked Nagoya in great strength. Osaka was pounded on March 13, when about one-seventh of the whole area of the Eitoku plant of the Alchi Aircraft Company was destroyed and seven other war plants and harbour installations were heavily damaged.

Invasion of Okinawa. Japanese Fleet defeated South of Kyushu. Tokyo's Arsenal Area burned out.—In a carrier-plane assault on the Inland Sea, March 18-19, a task force of Adm. Spruance's fleet, under Vice-Adm. Mitscher, damaged a score of Jap. ships and destroyed about 500 planes. No Amer. ships were lost, despite the fact that Mitscher's force lay in close proximity to the Jap. mainland. Among the damaged ships were two battleships, two carriers, four escort carriers, two cruisers, and four destroyers. Amer. aircraft losses were extremely light.

An Amer. force of about 100,000 men, supported by a large fleet of warships, including a Brit. task force under Sir Bernard Rawlings, invaded Okinawa, largest of the Ryukyus is. (67 m. long), some 325 m. S.W. of Kyushu, in the biggest amphibious operation of the Pacific war. The landings began on the W. coast on April 1, and very soon two airfields were captured. More than 1400 ships were involved in the operations, which were under the tactical command of Adm. Spruance. The role of the Brit. fleet consisted in the bombing and bombardment of the airfields of an is. to the S. of Okinawa itself and, later, of Formosa. The Jap. garrison numbered some 100,000 men. It was to be expected that the Jap. would offer fanatical resistance, especially as the distance of the is. from the Jap. mainland was only half that between Japan and the is. of Iwojima (660 m.), which latter was now in Amer. hands. The Jap. fleet slipped out from its Inland Sea bases with the evident intention of attacking the Amer. invaders of Okinawa or the allied warships protecting the land forces there. But on April 7 six of the enemy warships, the 45,000-ton *Famato*, one light cruiser, and four destroyers, were sent to the bottom, while another destroyer was set on fire, in a two-hour engagement with aircraft of Mitscher's carrier force, 60 m. S. of Kyushu. Of all the enemy ships engaged only three destroyers escaped. Only one ship of the U.S. force suffered minor damage and seven naval aircraft were lost. In all engagements during the two days the Jap. lost 417 aircraft. It was calculated by Amer. naval officers that in this engagement Japan lost about a quarter of what remained of her navy.

Meanwhile Amer. marines were pushing northwards in Okinawa against negligible resistance, but Amer. troops moving southwards were making only slow progress against an extensive system of strong-points, blockhouses, pill-boxes, and burial vaults and caves. On April 20 in one of the fiercest battles of the Pacific war, three Amer. infantry divs., after a dead-

lock of a fortnight, launched an attack against these intricate defences following one of the heaviest bombardments ever made in the support of amphibious troops. Up to April 25 21,269 Jap. troops were killed on Okinawa and surrounding is. and only 399 prisoners taken. Meanwhile Amer. Superfortresses continued their series of attacks on Tokyo and other tns. in Japan. In a raid on April 14 some 11 sq. m. of Tokyo's arsenal area in the centre of the city were burned out. In a raid on Nagoya (April 7) practically the whole of the Mitsubishi engine works, producing three-quarters of all Jap. aircraft engines, was destroyed.

The Battles for Okinawa.—There was to be no easy conquest of Okinawa. As a vital outer defence to the Jap. mainland the Jap. troops in Okinawa meant to fight to the death. The number of their dead had risen to nearly 39,000 by May 10, at which date the N. half of the is. was under Amer. control. A few days later Amer. infantry were fighting in Naha, chief tn. of the is. Marines crossed the Asato R. and fought through the ruins of the tn. to within 1000 yds. of its centre. The city abounds in natural and artificial caves and tunnels going down in places scores of feet below ground, thus constituting admirable defensive positions for small men like the Jap. By May 15 the Jap. had been driven from Conical Hill dominating their position in the outskirts of Naha. Shuri, the E. hub of the defence line and the old cap., was outflanked. But though allied progress was made on both the E. and W. coasts the tenacity of the enemy showed no abatement. The allied objective was to secure airfields on Okinawa for intensified air raids on the Jap. mainland, and the Jap. had to prevent this at all costs. There were furious counter-attacks in the battle of Naha and the Amer. infantry, who had taken Conical Hill, found the summit untenable owing to artillery fire from three other hills. Up to May 14 Jap. casualties were 47,000 (mostly killed), Amer. 20,950, of which 2770 soldiers and 1010 marines were killed. Many 'suicide' attacks were made by Jap. planes against Amer. warships and ground forces at Okinawa. Hundreds were destroyed, but still the 'suicide' planes persisted. Carrier aircraft of the Brit. Pacific fleet, in strategic support of their allies, heavily bombed tns. and airfields in the Sakishima group of is. on May 16-17. By the beginning of the eighth week of the great battle for the S. part of the is. the Amer. troops had not yet broken the main line of the Jap. defence. Though they had made their initial landings without opposition they had been able to advance only 7 m. in as many weeks. Their task was the more difficult from having to fight over and through hills honeycombed with caves and tunnels and the most elaborate system of concealed pill-boxes and other field works they had encountered in the whole Pacific war; and though the total of Jap. dead by May 20 had risen to more than 48,000 out of a force estimated to have been in the

beginning 85,000, their fighting was still as resolute, skilled, and fierce as ever, though they were constantly under fire from naval guns, ground artillery, and small guns, and from aircraft many times greater than the fire they could return. The Amer. losses by this date were 8300 dead and 22,200 wounded. Their immediate objective was Shuri, a walled and moated citadel, for without it any further advance in the Naha region would only render them open to dangerous flank attack. One of the chief Jap. fortresses was a 160-ft. high tunnelled hill called Sugar Loaf Hill, which was an important bastion for both Naha and Shuri, lying N.E. of Naha and W. of Shuri, and this position changed hands repeatedly; but the Amers. held Takamotaji, a suburb of Naha, which enabled them to repel the numerous counter-attacks. On May 22 the peak of Sugar Loaf Hill, after changing hands eleven times, was finally secured by the Amers. Yonabaru, almost opposite Naha on the E. coast and the second largest tn. of the Is., was taken on that date. Reinforced Amer. infantry and marines were now driving through pelting rains and deep mud into the Jap. line, whose E. extremity between Shuri and Yonabaru at last began to show signs of cracking. Brit. carrier planes again struck at the Sakishima Is., between Formosa and Okinawa, to neutralise Jap. airfields. Occasional aircraft attacks on Amer. ships were literally 'suicidal.' Off the Is. the Amer. destroyer *Laffey* was attacked a week previously by twenty Jap. planes, was hit six times by suicide planes, thirty-one officers and men being killed and sixty wounded. The ship's rudder being damaged she could move only in a circle, but though ablaze at sev. points she held out until the last enemy plane was driven off, her gunners having brought down nine, while six crashed on her deck. Hundreds of Jap. planes were lost during the Okinawa campaign, often more than 200 in a couple of days.

Tarakan invaded.—Australian and Dutch troops, who landed on Tarakan Is., off the N.E. coast of Borneo, on May 1, soon gained control of nearly all the practicable area, including the cap., the roads, and the oilfields, leaving the Jap. with only the central hilly part. Here again, as on Okinawa, Jap. resistance was most tenacious and the natural obstacles were great. The Australians had to fight along a series of ridges, gullies, and spurs, and the heavy undergrowth and concealed positions made it exceedingly close fighting. On May 29 six squadrons of Liberators dropped a hundred tons of high explosives over a wide area of Jap. resistance, the Australian infantry following up with a swift advance on the enemy's narrow defence line in the S.

Japanese Cities bombed.—Meanwhile massive air raids were being constantly carried out against the Jap. mainland cities. Some 9 sq. m. of densely populated Nagoya, one of the largest centres of Jap. aircraft and machine-tool production, were laid waste on May 13 when 500 Superfortresses from the Marianas

bombed the N. and N.E. areas of the city with 3500 tons of incendiary and explosive bombs. During 1½ hrs. over a million of the new 6-lb. jelly fire bombs, which spread unquenchable flames for many yards in every direction, were showered on the target area. This was the fourth time Nagoya had been heavily attacked by Superfortresses, the previous dates being March 12 and 19, and April 7, but this fourth attack was the biggest assault theretofore made with fire bombs in the Pacific war, the weight of bombs dropped exceeding even that of most of the 1000-aeroplane attacks by Liberators and Fortresses in Europe. There was great loss of life as well as destruction of shadow factories, where in thousands of homes sub-assemblies were made for aircraft and aircraft engines. Jap. opposition was weak to moderate and only two Amer. aircraft were lost. Two days later Nagoya was again attacked with incendiaries, and on May 26 a strong force of Superfortresses dropped 4000 tons of incendiary bombs on the heart of Tokyo, reducing it to a smouldering ruin, the flames devouring in their path gov. buildings, foreign legations, and the big departmental stores and shops that were clustered around the grounds of the imperial palace. The palace was burnt, but the emperor and the royal family escaped injury. Some nineteen Superfortresses were lost in this attack. Twelve were lost in an attack made two days previously on the Shinagawa industrial dist. of Tokyo, S. of the area hit on May 26. Yokohama was attacked for the first time by Superfortresses on May 28. Some 450 aircraft dropped 3200 tons of incendiaries in 30 min. on the city's extensive docks, shipyards, and industrial plants. Two Amer. aircraft were lost in this attack. At the same time further blows were struck at Tokyo and at Kawasaki, between the cap. and Yokohama. By the end of May some 51 sq. m. of Tokyo had been destroyed in attacks by Superfortresses. On June 5 nearly 500 Superfortresses made an incendiary attack on Kobe, the targets being railway stations, steel works, and shipyards. A similar force of bombers made a daylight raid with incendiaries on May 31 on Osaka, one of Japan's most congested cities, the targets being harbour facilities, shipyards, aircraft propeller works, and electric power stations. Six days later the city, then largely in ruins, was attacked by bombers with high explosives as well as incendiaries, the arsenal being the target.

Wewak and Bougainville Battles.—Meanwhile it remained to reduce the Jap. troops still holding out in parts of New Guinea and the Solomons. In an amphibious operation Australian troops captured Wewak Peninsula and Wewak airfield in N. New Guinea in an assault aimed at the capture of the major Jap. base of Wewak (May 11-13). By May 15 the Australians were in control of Wewak harbour. Elsewhere in the S. Pacific there was heavy fighting in Bougainville Is. In six months of fighting on this Is.

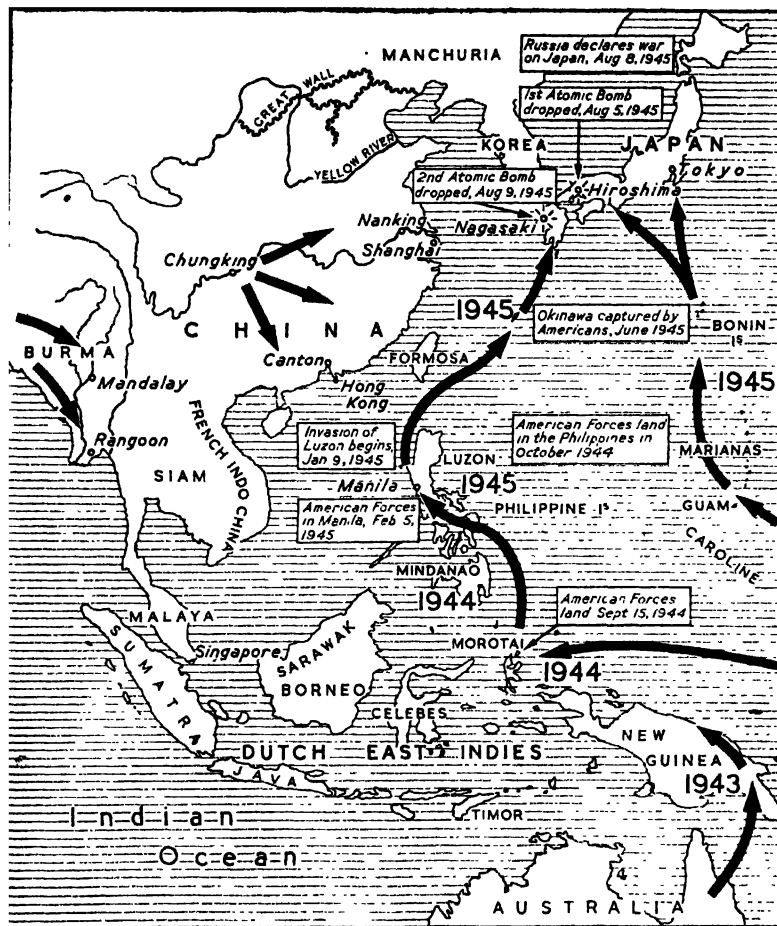
the Australians had killed 5000 Jap. and advanced 80 m. S. to the Pororel R. and 75 m. N. to Bona Peninsula and estab. themselves across the Hongorai R.

Okinawa almost conquered.—It cannot be said that the conduct of the Okinawa campaign satisfied all Amer. critics, some of whom pronounced the campaign to be a set-back. It was said that the navy sustained heavier losses than those sustained in all the weeks in protecting the army's landings in Normandy. President Truman, however, announced that army casualties on Okinawa between March 18 and May 29 were 10,221 killed and missing and 27,704 wounded. Jap. deaths were sixfold those of the U.S.A. Jap. suicide pilots also made a number of desperate attempts, but without very much success, to damage the allied fleets. It appeared that the entire Jap. Navy was being turned into a suicide force, with every man sworn to sacrifice his plane, his ship, or his life for the emperor. On June 2 a fresh landing was made by Amer. troops on the Chinen Peninsula, which is near the S. tip of the is. on the E. coast and forms the finest fleet anchorage in the S. approaches to Japan. Most of the peninsula was occupied on the 4th, together with almost all the Naha airfield. Thus the conquest of Okinawa was all but complete. Only 16 sq. m. of the is. remained in Jap. hands on June 11, but the campaign was still difficult. On that date three divs. made a heavy attack in the Yaeju Dake escarpment in S. Okinawa against some 10,000 Jap. In the Oroku caves Amer. marines found the body of Adm. Minoru Ota, commander of the Jap. base forces; he had cut his throat. Scores of Jap. whose retreat was cut off by rocket-firing landing craft threw themselves off the 160-ft. cliffs at Udo. On June 20 the Jap. defence of Okinawa was in its last stage, for of the original garrison estimated at 100,000 only some 2000 were now still alive and these were trapped. With the reduction of the is., the Amers. had secured an air base of incalculable value, being only 330 m. from the nearest Jap. home is. From this base and from bases in Iwojima and the Marianas the Amers. were now able to bomb Japan daily with such a weight of explosives as were never dropped anywhere before. Moreover from Okinawa they could now maintain such a command of the approaches to Japan from the S., from the Chinese mainland, and from Korea, that the Jap. dwindling stream of supplies from the outside world would soon be almost stopped; for on its E. coast Okinawa has a deep-water anchorage big enough for a great fleet, and sheltered from typhoons.

Japanese Garrisons in the Philippines, Solomons, and New Guinea marooned. Truk bombarded by British Fleet.—While the weight of the allied attack on the heart of Japan was now increasing rapidly, its front was being steadily broadened. In the Philippines the enemy's situation was desperate, for MacArthur's forces were crushing the remnants of the largest army which the Jap. had sent overseas

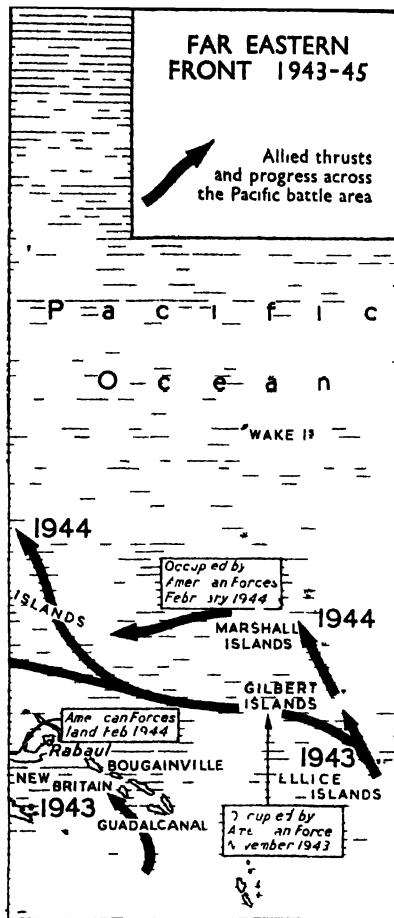
since they attacked Britain and America. One force under Gen. Yamashita was resisting in the mt. fastnesses of Luzon; another was holding out in the interior of Mindanao; but neither could hope to escape or delay the end for many weeks longer. What now the Jap. imperialists feared above all was the explosion of the legend of a divinely assured inviolability of the Jap. homeland, and so far allied bombers had destroyed nearly 1,250,000 buildings and rendered 5,000,000 persons homeless in half a dozen of the chief cities from March to May, and still the attacks were mounting in power. In the S.W. Pacific the Australians were steadily wearing down the resistance of the marooned garrisons in New Guinea, New Britain, and Bougainville. In the central Pacific large garrisons, by-passed by the Amers., sat aimlessly in Truk and other atolls awaiting the supplies that never came. Truk atoll, the 'Gibraltar' of Japan, was attacked by the Brit. Pacific Fleet on June 14-15. Aircraft carriers, cruisers, and destroyers left the place a battered wreck; but it was still estimated to hold a garrison of 40,000 and therefore still constituted a threat to allied forces and bases in the S.W. Pacific area. Meanwhile the Allies opened new fronts in Borneo and in China. While Australian and Dutch troops were overcoming Tarakan, other Australian forces landed on Labuan and at points near Brunel in the N. of Borneo. In China the Jap. at length seemed to be losing ground, for a Chinese advance won back Foochow, while another Chinese attack from Kweichow was threatening the Jap. land communications from Indo-China.

Japanese Key Defences on Borneo isolated. The Battle for Balikpapan.—Australian troops made a further landing in N. Borneo on June 19 at the refinery centre of Lutong in the Brit.-protected state of Sarawak, the Jap. making no attempt to hinder the landing. A naval force of light Amer. warships, with Australian gunboats and a destroyer, standing well in-shore, gave the landing beach a furious pounding, and did not cease until the assault troops were within a quarter of a mile of the land. The landing of guns and supplies by steel cables and tractors through a dangerous sea was a fine feat. Other Australians landed on July 1 at Balikpapan, in S.E. Borneo, after a heavy naval and air bombardment by U.S. forces. Gen. MacArthur went ashore with the first wave of assault troops. The Jap. key defences on Borneo had now been isolated by this new landing, following on the seizure of the bases of Tarakan Is. and the Brunel Bay area and Miri oilfield. Furthermore the strategic Macassar Straits, gateway to the Java Seas, were now controlled by allied surface craft, as well as by aircraft and submarine. The whole extent of Java and the important ports of Surabaya and Batavia were now within easy flight range. Allied ships could now, with land-based cover, go to any point in the S.W. Pacific. But there was very heavy fighting for Balikpapan. The Australians



found little opposition at the beach owing to the effectiveness of the fifteen-day naval bombardment of Balikpapan which preceded the landing. By July 3 the Australian 8th Div. had secured a three-mile strip of beach E. of the port and had driven inland for a mile or two against ever stiffening resistance. A day later they were 6 m. inland. Meanwhile the 9th Australian Div. in the Brunel Bay area were advancing with little opposition at both ends of a 125-m. coast-line now in their occupation. The main part of the tn. of Balikpapan fell to the Australians on July 3. The capture of Sepinggan air-strip and tn., 6 m. E. of Balikpapan, followed a 3-m. drive up the coastal highway. The rapid progress made by the

Australians was the more surprising because the Balikpapan defences were stronger than expected. The Jap. planned to flood the sea with blazing oil as an additional defensive measure. Pipelines laid to the beach and more than 100 oil tanks in the refinery area were, however, systematically destroyed by Liberators, whose bombing enveloped the whole dist. in a sea of blazing oil which flooded the streets and exploded the ammunition dumps. A scene of desolation confronted the Australians as they doubled from the encircling ridges into the centre of the tn. On either side of the main road was an almost unbroken line of gutted buildings and installations, with huge refining and storage tanks distorted by fire into fan-



tastic shapes. Bitterly as the Jap had fought to keep it, they finally surrendered the city almost without a fight, abandoning piles of ammunition and weapons, including dual purpose guns and anti aircraft guns, which were among their best weapons.

Anglo American Naval Air Attacks on Tokyo Area—More than 1000 naval aircraft of the Amer Third Fleet struck at Tokyo on the night of July 9, achieving complete surprise. Four battleships, four cruisers, and fourteen destroyers also took part. This was the thirty fourth consecutive day of air attacks on the Jap mainland. The chief targets on the 8th were bases of the Jap suicide aircraft, which had been attacking Amer. naval

units and forces on Okinawa. Two days later Adm Nimitz announced confidently that the Amers. had won 'complete mastery of the skies over Tokyo'. The main 14 of Honshu came under terrific attack on July 9-10. Hundreds of carrier-borne bombers swept over the 100 m. wide Kanto plain, aircraft centre of Tokyo's defences, while incendiaries and explosive bombs rained down on half a dozen industrial towns. Huge fires, fanned by a Pacific gale, blazed at a number of points along 450 m. of the Jap coast on the night of July 13, the aftermath of Superfortresses raids on four Jap cities. Some of the biggest fires were caused by flaming oil. On the 16th Brit ships took part for the first time in air attacks in great strength against the Tokyo area. These formed part of the largest combined Anglo-Amer task force yet assembled in the Pacific. The carrier *Formidable*, commanded by Adm Sir Philip Vian, and the battleship *King George V*, were among the Brit warships engaged. Vice Adm Rawlings was in command of the Brit fleet, most of whose great ships were now in Pacific waters.

Thus the storm of attack now beat more fiercely every week on the airfields, ports, and industrial cities of the Jap homelands. Blows that at first were struck from the air alone were now also being delivered by the Amer and Brit fleets. Powerful squadrons including some of the mightiest battleships in existence, supported by swarms of carrier-borne aircraft, were attacking Honshu and Hokkaido. So far the Jap battle fleet, sorely crippled by its heavy defeat off the central Philippines the previous Oct and by the great air attacks it had subsequently endured, had remained passive and had done nothing to protect coasts which the Jap people had until this period deemed inviolable and to which legend attributed the certain protection of a variety of tutelary deities. Even the suicide aircraft which had often inflicted loss and damage on the allied fleets in May-June were now conspicuously absent in these latest operations.

In Jap home waters, most important of the sea theatres in which the Far E war was being fought out, the concentration of allied strength had now reached massive dimensions. Great fleets had gathered together. The ring of allied air bases was contracting and closing in on Japan. Attack which in the previous spring could only be launched by bombers of the longest range from the Marianas and Guam could now be delivered from Okinawa, where new airfields were being added to those captured from the Jap. The increase in the number of aircraft-carriers now at the disposal of the Allies had reached a point when these powerful auxiliaries could be trusted to defend assemblies of warships and transports against any foreseeable attack even by land based aircraft. Steaming boldly inshore on July 15 where the rugged Muroran hills are plainly visible, the Amer. battleship *Iowa* and other ships of the bombardment group pounded the great

Nihon steelworks and Waniishi iron-mills on Hokkaido. Not a single Jap. plane appeared, nor did the shore batteries reply. Extensive damage was inflicted by Brit. and Amer. carrier-aircraft on July 18 on Jap. warships, merchantmen, and airfields in the Tokyo area. A force of 800 Superfortresses, the largest theretofore used against Japan, in the early hours of July 20, dropped 4000 tons of incendiary and other bombs on the cities of Choshi, Hitachi, Fukui, and Okasaki, the first being the chief fishing harbour on the E. coast of Honshu, the others large industrial centres. At this point nearly fifty Jap. cities had been bombed by Superfortresses in fifty-seven raids.

Australian Victories in Borneo.—Meanwhile the Australians in Borneo crossed Balikpapan Bay, landing on its W. coast and pressing inland against negligible resistance. But in the N. and N.E. there was bitter resistance. The Jap. used barriers of flaming petrol in an attempt to halt the progress of the Australians' armoured and mechanised transport in the Manggar area E. of Balikpapan, but the Australians took the Manggar airfield on July 10 and on the 18th captured Mt. Batochampar, the fall of which bastion marked an important stage in the campaign. Samboja, two-thirds of the way to the main oil production area, was taken on July 20.

Anglo-American Air Attack on Japanese Fleet. Further Superfortress Raids on Japanese Cities.—Adm. Halsey's Anglo-Amer. carrier aircraft, towards the end of July, attacked the Jap. fleet in its bases at Kure and Kobe. The battleships *Haruna*, carriers *Hyuga* and *Ise*, the cruisers *Tone*, *Aoba*, and *Oyodo*, a destroyer, and three submarines were sunk, and four destroyers, two destroyer escorts, and six freighters damaged. Some ninety-four Jap. planes were wrecked and fifty-six others damaged. Opposition was negligible.

Meanwhile seven task formations of the 20th Air Force of Superfortresses started great fires in some six of eleven cities which had been previously warned by leaflets to expect an attack. All the cities attacked were munition, transport, and industrial centres. Not a single Amer. plane was lost. On July 29 150 Mustangs crossed and recrossed Tokyo in attacks on airfields, railway stations, and shipping. On the morning of Aug. 1 800 Superfortresses, the largest force launched against Japan in the war, dropped a record load of 8000 tons of bombs on the industrial tns. of Hiroshi, Toyama, Nagasaki, Mito, and the petroleum estab. at Kawasaki.

Mounting Toll of Japanese Naval Losses.—Jap. shipping continued to suffer ever-increasing losses. During July Amer. aircraft from Okinawa destroyed or damaged 250 Jap. vessels totalling 250,000 tons. The object of this intensified air war was to cut off Japan from her sources of raw materials, food, and fuel, but irreparable damage was also done to her internal communications, naval bases, airfields, and factories. To accomplish

these purposes Okinawa was being expanded into the greatest air base in the world. Matsura, a naval base which by Brit. standards would rank with Plymouth, was now under constant air attack and the Jap. ships which had taken refuge there were doomed to destruction. All these losses were particularly depressing for a navy which had previously suffered crippling losses; for in the battle off the Philippines in Oct. 1944, between a quarter and a third of the Jap. battle fleet had been sunk, and since then Japan had lost the *Yamato*, the most powerful of her then remaining ships, while many warships had been sunk in abortive attempts to relieve Jap. garrisons marooned in the is. of the S.W. Pacific and in Indo-Malayan waters. Jap. naval strength was now only the ghost of what it was in 1941 and had virtually disappeared as a fighting force. Japan seemed to repose some hopes on the suicide aeroplane as a secret weapon, but while this aeroplane had unquestionably done damage it was negligible as an effort to diminish the terrible crescendo of air attack that was now crashing down upon the ports and cities of the homeland. Japan was now a power in decline and still greater blows were imminent.

The Atomic Bomb. Russia declares War on Japan.—On Aug. 6 a selected port, Hiroshima, was made the victim of the Anglo-Amer. new secret weapon, the first atomic bomb. Only one bomb was dropped on that day, but it had an explosive power equal to 20,000 tons of trinitrotoluene and had more than 2000 times the blast power of the largest bomb used up to that time. Small wonder that part of Hiroshima, a tn. or base of 244,000 inhab., was wiped out at one single blow. Reconnaissance photographs showed that over 4 sq. m. of the tn.'s total area of 7 sq. m. were destroyed and heavy additional damage was done outside the completely devastated area (see further under HIROSHIMA). On the succeeding day 800 tons of ordinary high explosive were dropped on the Toyokawa naval arsenal. Then on Aug. 8 came a second blow to Japan, when Russia declared war on her, and on the next day the Red Army attacked along the Manchurian border.

Japan surrenders.—A second atomic bomb was dropped on Aug. 9, this time on Nagasaki. The bomb used here was said to have rendered obsolete that used against Hiroshima, being easier to assemble. Already great laboratories had been estab. in the Marianas, with a large staff of scientists to test materials and assemble the bombs. One-third of Nagasaki was wiped out, including the Mitsubishi steel and arms works and the Mitsubishi-Urakami ordnance plant. The use of the epoch-shaking atomic bomb received a mixed reception from public opinion both in America and in Britain, but in the ultimate analysis it would seem impracticable to 'humanise' war or the weapons of war. It is only necessary to state here that the bombs were a means of hastening the collapse of Jap.

resistance. On the day that the second atomic bomb was dropped allied aircraft based on Okinawa destroyed sixty more Jap. ships. This proved the last straw, though it is to be borne in mind that Japan was already on the edge of defeat. For apart from having no defence to the new bomb, Japan's sole recent successes in the war were those won by suicide aircraft which had sunk twenty-four warships (including three escort carriers and eleven destroyers) and damaged 164 others (including seven battleships) with great loss of life. They did not succeed, however, in sinking any armoured vessel and they did not put any Brit. warship out of action. But a truer picture of Japan's plight was that shown by the wreckage of the Jap. Navy which strewn the is. shores after Japan had lost all but forty-nine of her 369 warships. Months before the dropping of the first atomic bomb Japan had been brought to measurable distance of collapse as a result of the destruction of its fleet and the increasing air blows at the homeland, although Japan still had a very strong army (in the homeland 2,000,000 trained professional military personnel, in China, Manchuria, and Formosa 3,000,000 men), and a considerable air force (11,000 aircraft, of which 6000 were combatant types). In fact the situation in which what once had been one of the strongest military powers had been brought to surrender without the defeat of its army was unparalleled in hist. and created problems which had to be solved without guidance from the past. Japan entered the war with twelve battleships and now had but one, the *Nagato*, and even that was heavily damaged and without a crew. Of her nine front-line carriers the *Hatoka* and the *Katsuragi*, both heavily damaged, alone remained. Of nineteen heavy cruisers, only two remained, both being at Singapore, badly damaged. Similarly, of twenty-four light cruisers, but two were left. The number of destroyers, estimated originally at 165, was now reduced to twenty-six, sev. of which were badly damaged. Of the original 140 first-line submarines only sixteen remained, in addition to six former Ger. U-boats. Even so, however, the invasion of Japan might have been resisted a *outrance* and would no doubt have entailed enormous casualties, a prospect which was unquestionably exercised by the atomic bomb. The same day the atomic bomb was dropped on Nagasaki the Jap. Gov. announced their readiness to accept the Allies' Potsdam terms of surrender, provided they did not prejudice the prerogatives of the emperor. The Allies' reply, while not asking for the emperor's abdication or dethronement, made it clear that his authority, together with that of the Jap. Gov., should be subject to the allied supreme commander from the moment of surrender and that the emperor himself would be required to authorise and ensure the signature by the Jap. Gov. and the imperial general headquarters of the surrender terms, and, further, that the emperor must issue orders to commanders in the field to cease

fire and surrender their arms, and be ready to issue any other orders which the allied supreme commander might demand in order to give effect to the surrender terms. In a word, the Allies intended that the emperor should acknowledge and bear his share of responsibility in ending the war which he sanctioned and that this 'semi-divine being' must be acknowledged to have been led away by the wrong advice of ministers and generals, a bitter pill for the Jap. people to swallow, the more especially as the traditional military caste was built round the fiction of the emperor's sacrosanctity as the 'Son of Heaven.' On Aug. 14 Japan surrendered, and it was on that date therefore that the Second World War came to an end. The emperor issued orders for all Jap. forces to cease fire, though it was estimated, through broadcasts from Tokyo, that it would take six days for the orders to become effective in China and Hongkai, twelve days in New Guinea and the Philippines, and still longer in Burma. At the same time Marshal Vassilievsky sent the Jap. Kwantung Army an ultimatum to surrender its arms by Aug. 20. The continued resistance of the Jap. armies in Kwantung after the surrender of the metropolis was an eventuality which the Russians had foreseen, and it caused no hitch in the steady development of operations in Manchuria and Korea. But by Aug. 17 Jap. forces had begun to surrender on sev. sectors of the Manchurian front. Hostilities in Hongkai ceased by Aug. 19. In Burma, in the Karen Hills, the war went on as if nothing had happened, but the surrender here was confused by the great distances involved. On Aug. 20 Lord Mountbatten, supreme allied commander of the S.E. Asia Command, broadcast directions to F. M. Count Terauchi, commander of the Jap. Southern Army, to send a representative with plenipotentiary powers to meet his chief of staff at Rangoon, and the meeting took place there on Aug. 28. By Aug. 23 the Jap. in the Philippines were beginning to surrender in large numbers as the news of the capitulation reached the mt. fastnesses.

Russian Campaign in Manchuria.—In broad outline this whirlwind sixteen-day campaign, in which the Russian armies were under the supreme command of Marshal Vassilievsky, consisted in the envelopment of the three main Jap. fortified areas: the Hailar-Solun area in W. Manchuria, the Sungari-Sakhalyan in N. Manchuria, and the maritime area in E. Manchuria. Operations were planned to take every advantage of the superiority of Russian armour over Jap. anti-tank weapons. Attacking on a broad front in the E., Marshal Meretkov's forces came to grips with the main forces of the Jap. Third Army in the first days of the campaign by outflanking the frontier defence zone. From the N. Gen. Purkayev, by a wide manoeuvre to Mergen, surrounded the Jap. 123rd Infantry Brigade and blockaded the Sukhalyan defence zone. Up the valley of the Sungari other forces of Gen. Purkayev's command thrust

towards Harbin. From the W. Marshal Malinovsky by-passed all Jap. positions W. of the great Khingan range by throwing armour forward in a spectacular advance. Relying on transport aircraft for water and fuel, Russian tanks were at times operating 500 m. from their bases. They crossed country which for hundreds of miles was without either shelter or wells. Great belts of grasslands were set ablaze by the retreating Jap. By Aug. 20 the Russians had conducted vast enveloping moves which brought the whole of Manchuria from the borders of Inner Mongolia to the sea of Japan, and from the middle Amur to the Yellow Sea, within the grasp of their armies. Soon afterwards Russian airborne troops landed in the tns. of Dalren and Port Arthur and began to disarm the garrisons. On the 31st the Russians took prisoner 71,000 Jap. officers and men. By the 23rd the Russians were in occupation of the whole of Manchuria, S. Sakhalin, and the Is. of Shumshu and Paramushiro in the Kurile archipelago. On that day the Jap. Kwantung Army, after unsuccessful counter-attacks, laid down their arms and surrendered to the Red Army.

Allied Troops enter Japan.—Amer. airborne troops landed at Atsugi airfield, 18 m. from Tokyo, on Aug. 28 to prepare for the formal occupation under Gen. MacArthur. A huge armada of allied warships had now assembled off the coast of Japan. Four-fifths were Amer. ships, the rest mainly Brit., together with Brit. Dominion and some Dutch. Some nine allied ships entered Tokyo Bay on the same date. The main landing of allied troops began the next day, airborne forces arriving in strength at the Atsugi airfield, while Amer. and Brit. marines disembarked at Yokosuka naval base. The allied forces, spreading out over Yokosuka, Yokohama, and a large portion of the Tokyo plain, now had a strategic grip on the Tokyo Bay region. Meanwhile (Aug. 30) a strong Brit. naval force, under Rear-Adm. Harcourt, entered the harbour of Hong Kong, which had been in Jap. occupation since Dec. 27, 1941. They seized the naval dockyard and ejected all Jap., including the naval and military commanders. No actual instruments of surrender had yet been signed owing to the physical difficulties imposed by great distances and the fact that large numbers of Jap. forces were scattered over far-flung areas of the Pacific. But on Sept. 2 Jap. envoys, in the presence of fifty allied generals and other senior officers, signed the allied instrument of unconditional surrender aboard the Amer. battleship *Missouri* in Tokyo Bay, and immediately afterwards a convoy of forty-two ships entered the bay and landed 13,000 Amer. troops for the march on the cap. The new Jap. Prime Minister, Prince Higashi Kuni, broadcast an appeal to the Jap. people to carry out faithfully the terms of the surrender and the orders of the emperor. There were other formal surrenders to be made in Luzon, New Guinea, the Solomons, Malaya, and Burma, but with the signing of the instrument of

surrender on the *Missouri*, Japan had at last come to the end of her dream of conquest. When the Jap. representatives, comprising either senior army officers or silk-hatted officials, came on board the Amer. warship in the early morning clouds covered the bay, but it was light enough for them to see and to wonder at the armada of Amer. and Brit. ships dominating their cap., including H.M.S. *Duke of York* and *King George V*. Gen. MacArthur signed the surrender documents as supreme commander, Adm. Nimitz signed for the U.S.A., Adm. Sir Bruce Fraser for Britain, Gen. Hsu Yung-chang for China, Lt.-Gen. Kuzma Deev-yanko for Russia, Gen. Blamey for Australia, Air-Vice Marshal Isitt for New Zealand, Gen. le Clerc for France, and Gen. L. H. van Oyen for the Netherlands. Mamoru Shigemitsu, former ambas. in London and now foreign minister, signed for the emperor, and Gen. Yoshijiro Umezu on behalf of the Jap. Imperial General Staff. On this occasion the Amer. flag flown by the *Missouri* contained only thirty-one stars as opposed to the forty-eight of to-day. It was the flag flown by Commodore Perry, U.S.N., when he entered Jap. waters ninety-two years earlier. Some 200,000 Jap. troops on various by-passed Pacific Is. laid down their arms on Sept. 3 at five minor surrender ceremonies aboard Amer. warships in the S.W. Pacific. These were Truk, naval strongholds in the central Carolinas, Palau, the Bouina, N. of Guam, Rota in the Marianas, and Pagan, N. of Salpan.

British Forces enter Singapore.—Adm. Sir Arthur Power, commander in chief of the E. Indies Fleet arrived at Singapore on Sept. 3 with a Brit. naval force, Royal Marines having taken over Penang the same day. Brit. and Indian troops landed at Singapore on Sept. 5. It was a peaceful entry, though as a precaution against treachery the first wave of troops came in assault craft. The return to Singapore was certainly remarkable, for the landing had been planned as a carefully phased military operation, so that if the enemy offered resistance it could be overcome. But in the result the operation resembled a civic reception, the Jap. general representing Gen. Itagaki, commander in the Seventh Area (Malaya, Java, and Sumatra), waiting on the dockside to greet the first allied troops.

The surrender in the S.W. Pacific was signed on board H.M.S. *Glory* in St. George's Channel, 28 m. S.E. of Itabaul, on Sept. 6. Gen. Imamura, commander-in-chief in the S.W. Pacific, handed his sword to Lt.-Gen. Sturdee, commanding the Australian First Army, and both he and Adm. Kusaka, commanding the Jap. fleet in the area, signed the surrender.

Surrender in South-east Asia Area.—The official surrender in S.E. Asia took place in the council chamber of the municipal buildings in Singapore. It was an impressive ceremony. The Jap. representatives were Gen. Itagaki in place of Count Terachi, the supreme commander, who was said to be too ill to attend, and the commanders of the Jap. armies in

Siam, Burma, and Singapore, and of the enemy fleets based on Singapore and Surabaya. At the head of the allied officers was Adm. Mountbatten, the supreme commander of the area, with Lt.-Gen. Slim, commanding the forces in the area of S.E. Asia, Adm. Sir Arthur Power, Air Marshal Sir Keith Park, and Lt.-Gen. Wheeler, deputy supreme commander. It was evident that in a combined area of 1,500,000 sq. m., with a pop. of nearly 130,000,000, the command would have months of planning before it could complete the removal of some 500,000 Jap. soldiers and the bringing them back to peace conditions, and the repatriation of prisoners of war and civilian internees numbered over 200,000.

Japanese surrender in New Guinea.—It was not until Sept. 13 that Gen. Adachi, commander of the Jap. Eighteenth Army, after an ultimatum had ended his long procrastination, surrendered the Jap. forces in New Guinea to Maj.-Gen. H. C. H. Robertson, commander of the 6th Australian Div. Thus ended a long and arduous campaign in which the Australians encountered some of the toughest enemy forces in the Pacific. The Australians had succeeded the Amers. in Nov. 1944, but for some time could only act on the defensive in New Guinea and in its satellite Bougainville. Wewak, garrisoned by 20,000 Jap., was not taken until the end of March 1945, and the final offensive in Bougainville was not launched by the Australians until early in April. But by the end of July the Jap. 41st Div. had been virtually annihilated, while in Rabaul the Australians were effectively containing as if in an internment camp an enemy force of no fewer than 50,000 men, who, however, despite daily bombing were well supplied with ammunition and food, and indeed able to supply themselves indigenously for an unlimited time.

Burma and Hong Kong surrendered.—On the same day (Sept. 13) Gen. Ichida signed the instrument for the surrender of Burma to the Brit. Twelfth Army at Rangoon (see further under BURMESE CAMPAIGNS IN SECOND WORLD WAR). The Jap. in Hong Kong did not surrender until Sept. 16, though the R.N. had been in possession of the dockyard since Aug. 30.

Japanese Atrocities.—The State Dept. in Washington lost no time in apprising the world of Jap. atrocities. The dept. on Sept. 5 pub. a long document containing the unsavoury story of 'Japan's barbaric torture and wanton murder' of Amer. prisoners of war and charging Japan with the violation of practically every law concerning the treatment of prisoners of war and internees. It accused the Jap., *inter alia*, of ordering all the prisoners taken in the closing days of the Philippine campaign to be killed, of tossing grenades in the hold of a sinking ship containing 750 Amer. prisoners, and of making a bonfire with petrol out of an air raid shelter and burying alive the survivors of the 150 Amer. prisoners in it. The stories of prison ships were equally horrifying.

See S. Morrison, *This War against Japan*, 1943, and *Ocean Front*, 1945; O. Tellachius, *Tokyo Record*, 1943; Adm. Sir W. M. James, *The British Navies in the Second World War*, 1946; Lt.-Gen. B. E. Lippincott and others, *From Fiji through the Philippines with the Thirteenth Air Force*, 1948; Lt.-Gen. A. E. Percival, *The War in Malaya*, 1949; V. Spencer Chapman, *The Jungle is Neutral*, 1949; and J. E. Cresswell, *Sea Warfare, 1939-1945*, 1949.

Pacific Girdle, see under IGNEOUS ROCKS.

Pacific Ocean, largest div. of the hydrosphere, extends from the Southern Ocean (lat. 40° S.) to Behring Strait, *e.g.* practically to the Arctic Ocean; it is, however, continuous with the Southern Ocean to 80° S. lat.; it divides the Old and New Worlds, and is roughly bisected by 170° W. long.; greatest breadth, 10,000 in.; length, 7000 m. In shape it is very roughly pentagonal, very broken to the W. and S.W., where it communicates with the Indian Ocean; it has an area of 63,634,000 sq. m., nearly 40 per cent. of the whole water extent of the world.

Coast-line.—The coasts of America which meet the P. O. are steep and even, with fjord formation in the N. and S. Australia shows a somewhat similar coast, but the Old World presents a series of fringing seas with festooned is. enclosing them, and a much gentler slope of coast; the continental shelf is here more extensive. At a mean distance of 475 m. as against 386 m., the P. O. has a coast-line of only 49,000 m. as against 90,000 m. of the Atlantic. The drainage area is very small, only a little more than one-quarter that of the Atlantic, although the actual ocean surface is 12 times as great. The terrigenous deposits are correspondingly small and nearer land, mostly covering the fringing seas. Red clay occupies about three-fifths of the whole area lying towards the E.; globigerina ooze, two-thirds of that in the Atlantic, occupies the intermediate depths towards the W. and off S. America.

Depth.—The mean depth of the P. O. is 3870 metres, and it exceeds that of the other oceans; the W. is deeper than the E., and the N. than the S. Some of the great depths appear to lie up against the festooned is., *e.g.* the Tuscara Deep (max. 4665 fathoms) lying along Japan and the Kuriles for 400 m.; the Aldrich Deep, E. of New Zealand (max. 5155 fathoms). The greatest depth sounded is 5269 ft. between Midway Is. and Guam. Soundings in 1921 revealed the greatest depths in the Aleutian trench, 7382 metres, and in the year 1927 the greatest recorded ocean depth was made by the Ger. cruiser *Emden* of 10,800 metres, near the Philippine trench E. of Mindanao.

Islands.—The P. O. is notable for its large number of oceanic is. grouped in the central and W. regions; they are all volcanic or coral, many being atolls, and number over 2500, with an area of 70,000 sq. m. The P. O. is unique in its complete girdle of volcanoes of the continental coast and is, with accompanying manifestations of earthquakes. The temp.

and salinity show no very marked abnormalities, though the P. O. is in general less saline than the others.

Currents.—Under the influence of the winds a clockwise swirl is formed in the N. Pacific; the waves produce a N. equatorial current along lat. 15°, turning N. by the Philippines, and joining irregular branches from the E. Indies and China Sea to form the Kuro Siwo, the Gulf Stream equivalent, at Formosa; this becomes a W. wind drift in lat. 45° N., branching opposite Vancouver to form the California current, N. an independent swirl following the Alaskan coast to join the W. wind drift again. A cold Arctic current enters from Behring Strait and circulates through the sea of Okhotsk and the Japan Sea, making the mainland coast ice-bound in winter. An equatorial counter-current is well estab. over the E. part, but less so in the W. In the S. Pacific the trades cause a S. equatorial current along the equator and to 15° S., branching very irregularly in its westward course, among the is. to the W., and forming four distinct currents, turning southward to form the great anti-clockwise swirl. These unite in their eastward course about lat. 40°, to branch opposite S. Chile, N. forming the Peru current, S. joining the W. wind drift round Cape Horn.

History.—Balboa sighted the P. O. from Panama in 1513. Magellan sailed through the strait bearing his name in 1520, and gave the name to the ocean. In 1577 Drake, the first Englishman to enter the P. O., sailed N. to California and across to the Moluccas. In the seventeenth century the Australasian region was explored, and a more careful and detailed extension of the work occupied the eighteenth century. Many scientific expeditions were carried out during the nineteenth. Valuable contributions to the survey work of the P. O. have been made by the Jap. Gov. as well as by the U.S. oceanographical dept. of the navy. For campaigns in the Second World War see PACIFIC CAMPAIGNS or FAR EASTERN FRONT in SECOND WORLD WAR. See A. Brigham, *Index to the Islands of the Pacific*, 1900; T. R. Saint-Johnston, *South Sea Reminiscences*, 1922; F. Zorck, *Annalen der Hydrographie*, 1928; W. G. Ivens, *Island Builders*, 1930; G. E. R. Deacon, *Dynamics of the South Ocean*, 1937, and *Hydrology of the South Ocean*, 1937; J. W. Vandercook, *Dark Islands*, 1938; J. A. Williamson, *Cook and the Opening of the Pacific*, 1949; R. Gibbins, *Over the Reefs*, 1949; and bibliography of OCEAN and OCEANOGRAPHY. See also OCEAN; TERRA AUSTRALIS INCOGNITA.

Pacific Steam Navigation Company obtained a charter in 1840 and ran two steamers along the coast of S. America from Valparaiso to Panama. It was the pioneer of the steam trade along the coast, but in its early years the company suffered very heavy losses owing to the difficulty of obtaining fuel. One result of this was that it used compound engines long before the Atlantic companies, and thenceforward achieved prosperity. In 1870 their ships ran from Callao to Liverpool,

and by 1874 they had a fleet of fifty-four steamers running. In conjunction with the Orient Navigation Company the Pacific Company had estab. the Orient Line, from which they withdrew in 1906. In 1910 the whole of the P. S. N. Co.'s ordinary capital was purchased by the Royal Mail Steam Packet Company, which company still has the controlling interest in it. Its services are to the E. and W. coast of S. America via the Panama Canal and the straits of Magellan from Europe, to the W. coast of S. America and to Colombian and Ecuadorian ports from New York; and there are also Central Amer. services.

Pacifism, see PEACE; PEACE SOCIETIES. **Pactolus**, in anct. times the name of a brook in Lydia, Asia Minor, now called Sarabat. It rises in Mt. Tmolus, and flows past Sardis into the gulf of Smyrna. Its sands were once famous for gold, and tradition attributes the wealth of Croesus to them.

Pacuvius, Marcus (c. 220-130 B.C.), the greatest of the Rom. tragic poets, b. at Brundisium. He was the nephew of Ennius, on whose style he modelled his dramas. He also devoted some of his time to painting. He died at Tarentum. Among his works are *Antiope* and *Armorum Iudicium*. See O. Ribbeck, *Scenica romanorum poesis fragmenta*, 1897, for a collection of his writings, and W. Y. Sellar, *Roman Poets of the Republic*, 1863.

Padang, tn. of Sumatra, Indonesia. It is on the S.W. coast, and trades chiefly in coffee, tobacco, copra, hides, gold dust, and spices. P. fell to the Jap. forces in Feb. 1942. Pop. 52,000.

Paddington: 1. Dist. and parl. bor. of London, 4 m. N.W. of St. Paul's. It is divided into two divs., N. and S., each of which sends a member to Parliament. The terminus of the Western Region Railway is at P. Pop. 97,000. See LONDON. 2. Suburb of Sydney, New S. Wales, Australia, 3 m. S.E. thereof. It has industries of brewing, tanning, and soap making. Pop. 36,000.

Paddle-steamers, forerunners of screw-driven steamships, are boats propelled by paddle-wheels, which are driven by steam. The use of boats with paddle-wheels dates from very anct. times, both the Romans and Egyptians being acquainted with some form of them; in later times R. Valturinus in his work, *De Re Militari* (1172), records the use of paddle-boats. Dr. Denis Papin, a native of Blois, suggested towards the close of the seventeenth century that his invention of a steam cylinder fitted with a piston could be applied to work paddle-wheels, but the idea does not appear to have been successfully carried out. T. Savery invented a steam-condensing system, which he claimed could be applied to ships; J. Hulls claimed that he was the actual inventor of the paddle-steamer, in which he used ideas of Savery and Papin, but his boat does not seem to have worked successfully. The *Pyroscopie* of the Marquis de Jouffroy was successful in travelling up the Saône unaided in 1783, but no commercial success followed. The

boat built by S. Moray in 1797, with two paddle-wheels, gave the best results experienced till then. In 1803 Robert Fulton made his first trip, and in 1807 Stevens built a paddle-steamer, the *Phoenix*, which plied for six years on the Delaware, whilst in the same year the *Clermont* of Fulton reached a speed of 5 m.p.h. on a trial trip. During the next decade the number of steamers on the Mississippi increased, and from 1835 the speed attained was greater. In England Symington in 1802 built a stern-wheel steamer, but the *Comet* of Henry Bell, first built in 1804 and wrecked in 1820, was the first paddle-steamer employed regularly and successfully in Great Britain. For the varieties of wheels see PADDLE-WHEEL. See R. Murray, *Marine Engineering and Steam Vessels*, 1852, and E. C. Smith, *Short History of Naval and Marine Engineering*, 1938.

Paddle-wheel, wheel used for propelling a boat or ship. As originally tried, it consisted essentially of a series of paddles or paddle-like spokes inserted in an axle drum or wheel. The term was avoided by the eighteenth-century inventors and theorists, who spoke of a 'water-wheel,' a 'rowing-wheel,' 'revolving oars,' etc. The name P. gradually came into use after 1815. In its eventual development flat boards were fitted more or less radially round the circumference, so as to press backward like a succession of paddles against the water. Two wheels are generally used, one on each side of the vessel, a little aft of midship, so as to catch the tops of waves; in riv. steamers, where there is no great depth of water, one only, placed at the stern, is sometimes used. The floats of the earlier paddle-boats were fixed rigidly to the wheel. Later feathering Ps., in which each float is fixed to a pin at the back and connected at the centre of the wheel to a small eccentric by means of a lever connecting with a small arm fixed rigidly to the back of the float, were used; the eccentric is rigidly attached to one of the levers, causing it to rotate with the wheel. By this method the old 'churning of the water' is lessened. The use of paddles has been discontinued in favour of screws for cargo boats and ocean-going ships. The efficiency of the paddle is greatest at a certain constant immersion; and when draughts vary the level of floats must vary also. Rolling affects the paddles and strains the engines, as one paddle offers very great resistance while the other is racing. The speed of the floats depends on the diameter of the wheel; more breadth is required for vessels with paddles, as each paddle is about one-fourth of the breadth of the boat, but they are very suitable for excursion steamers, being fast, easily managed and started.

Paddy and Paddy Bird, see RICE and RICE BIRD.

Paderborn, tn. in Westphalia, Germany, formerly a Hanse tn. One of the chief buildings of note is the cathedral, part of which was built during the twelfth and thirteenth centuries. In it is the silver coffin of St. Liborius. P. was heavily

damaged during the Second World War the cathedral, tn. hall, and sev. churches suffering in varying degrees. Pop. 37,300.

Paderewski, Ignace Jan (1860-1941), Polish pianist, composer, and statesman, b. at Kurjówka, in Podolia, son of a Polish gentleman farmer; studied at Warsaw and Berlin. Always remarkable for strong personal views as an artist, he developed his talent in his own way from the first, and such piano instruction as he received at Warsaw was merely part of the curriculum; and when, in 1876, he made his first public appearance, it was mainly with the purpose of introducing his own compositions (pieces in the form of Polish dances), which at that time he was not technically proficient enough to play more than passably well. His first wife was the young pianist, Antonina de Korsak, who d. in childbirth in 1881. He taught at Warsaw and Strasburg 1878-84. It was at Strasburg that he met the actress, Modjeska, a gifted countrywoman of his, who first perceived the true bent of P.'s genius, and persuaded him to become an interpretative artist, and he placed himself under Leschetizky in Vienna, three years' intensive work with that accomplished master turning him into a finished executant. He appeared at Vienna, 1887; toured Germany, 1888; visited Paris, 1889; London, 1890 (when he first came to England he was known only as the composer of the *Minuet in G*, which comes from his *Humoresques de Concert*, op. 14); and America, 1891. His name became a synonym for a perfect pianist. He toured Europe extensively until his second marriage, in 1899, to baroness de Rosen, afterwards devoting himself principally to composition, although he still played occasionally. He wrote some good piano music, especially his popular *Polish Fantasia* with orchestra; his opera *Manru* was produced at Dresden (1901) and New York (1902), and his symphony at London (1912). His idol was his countryman, Chopin, in the interpretation of whose passionate, whimsical, and splenetic moods he was unapproached.

He was politically active in the cause of Poland during the First World War, and was first Prime Minister and minister of foreign affairs of the Polish Republic, 1919-20. The idea of creating a Polish army outside Poland was his (1916), and with that aim he was sent to America as delegate of the Polish National Committee which had been formed in Paris. Soon after the armistice he came to London to seek help in reconstituting the new Polish state. His presence, subsequently, in Poznan at a time when there was danger of Poland having some association with Germany, roused the Poles there to tremendous enthusiasm, and a revolt broke out which resulted in most of the prov. of Poznan being wrested from the Germans; its transfer was confirmed by the treaty of Versailles. It was at the peace conference that he was at his best as a statesman; if he claimed less than his countrymen desired, he acquired for Poland the good will and confidence of the other delegations. He retired to his estate in

California in 1920, and in 1922 returned with *éclat* to the concert stage. P. received many honours, including, in 1925, the G.B.E. Univs. in all parts of the world conferred honorary degrees on him. Oxford made him D.O.L. and Cambridge Mus.D. See lives by E. A. Vaughan, 1907; J. F. Looke, 1928; H. Opienski, 1929; A. Henderson (*Contemporary Immortals*), 1930; R. Landau, 1934; O. Phillips, 1934; and *Memoirs*, ed. by Mary Lawton, 1939.

Padiham, tn. of Lancashire, England, 3 m. N.W. of Burnley. The inhab. are engaged in the manuf. of textile goods, engineering, furniture manuf., mining, etc. Pop. 10,000.

Padişah (*pad*, throne, and *shah*, sovereign), title assumed by the sultan of Turkey. The Ottoman Porte formerly called only the Fr. king P., calling the other sovereigns of Europe 'kral,' but the name has now been applied to other leading sovereigns.

Padova, see **PADUA**.

Padstow, seaport of Cornwall, England, on the estuary of the Camel, 5 m. N.W. of Wadebridge. Pop. 2400.

Padua, Duke of, see **ARRIGHI**, **TOUS-SAINT**.

Padua (It. *Padova*, anct. *Patavium*): 1. Episcopal city, cap. of the prov. of P., Italy, on the canalised part of the Bacchiglione, 22 m. W.S.W. of Venice. The cathedral (sixteenth century) has a baptistry dating from the twelfth century. The church of the Eremitani (destroyed in 1944) was an old Augustinian church of the middle thirteenth century (restored in 1880), containing frescoes by Andrea Mantegna and his contemporaries of the school of Squarcione, which were amongst the most important examples of N. It. art. The campanile is intact, and reconstruction of the roof, apse, and façade has been completed. The church of San Antonio (1307) contains the tomb of the patron saint of P. and a high altar designed by Donatello; his magnificent equestrian statue of Gattamelata stands outside. Other notable buildings of P. are the observatory, occupying the tower of the palace of Ezzelino da Romano (thirteenth century), and the univ., founded in 1222 and famous as a seat of learning in the Middle Ages. There is a modern engineering college here. In the S. part of the city is the Piazza Vittorio Emmanuele, adorned with numerous statues, some by Canova. The botanical garden connected with the univ. is the oldest in Europe. The chief industries of P. are breweries, distilleries, foundries, corn and saw mills, motor car and chemical factories. P. claims its origin from the time of Troy. It was formerly the most important tn. of Venetia; Livy was born here in 59 B.C., and the painter Mantegna (1431-1506). It was sacked by Alaric the Goth and by Attila the Hun in 452. In 1337 it came under the rule of the Carrara family, and was taken by Venice in 1405. It was occupied by the Fr. in 1797, and in 1811 ceded to Austria, who retained it until Venetia passed to Italy in 1866. Pop.

161,900. See C. Foligno, *The Story of Padua*, 1910 (Medieval Towns); G. Newman, *A Century of Medicine at Padua*, 1922; and H. la Farge, *Lost Treasures of Europe*, 1946. 2. Prov. of Venetia, Italy, traversed by the Rs. Bacchiglione, Adige, and Brenta, and intersected by a network of canals which connect it with the Adriatic; it is a fertile plain, producing grain, wine, rice and fruit, and grazing for cattle. It has stone quarries and mineral springs. Area 826 sq. m. Pop. (1936) 640,000.

Paducah, co. seat of McCracken co., Kentucky, U.S.A., 48 m. N.E. of Cairo, Illinois. It manufs. iron goods, machinery, flour, and pottery, and is an important strawberry and tobacco market. Pop. 33,700.

Padus, see **PO**.

Pæan (Gk. *ἰατρ*), in Gk. mythology, the physician of the gods, but later Gk. writers invariably use P. as a title of Apollo in his aspect of healer. Later the word was synonymous with 'song of thanksgiving' and 'hymn of victory,' meanings derived apparently from *ἰατρ*, an invocation to Apollo and other deities.

Pædo-Baptists (Gk. *παῖς*, *παῖδ*, a child, and baptist), one who holds and practises infant baptism. Since this is the normal practice in most Christian communities, the term is used but rarely. See also **ANTI-PÆDOBAPTISTS**.

Pælgian Dialect, see under **LATIN LANGUAGE AND LITERATURE**.

Pæony, genus of herbaceous and shrubby perennials (family Ranunculaceae) which includes some of the most magnificent garden flowers. The herbaceous kinds are the hardier and are more widely cultivated than the shrubby tree of mt. Ps. These, if grown out of doors, need protection from spring frosts; they are very valuable for gentle forcing under glass. *P. corallina* is naturalised on an is. in the Severn, and by some authorities is considered a true Brit. native.

Pæstum (Gk. *Ἰαεστῖον*, modern *Pesto*), Gk. colony in Lucania, S. Italy, situated near the bay which took its name from the tn. (Pæstus Sinus—gulf of Salerno). It is supposed to have been founded by colonists from Sybaris about 600 B.C. After the Lucanians had conquered the city it fell into the hands of the Romans, who, in 273 B.C., also founded a colony there. After suffering at the hands of the Saracens during the ninth century, and being partially destroyed during the eleventh, it was eventually abandoned during the sixteenth century. The ruins of two Doric temples at P. are among the most remarkable remains of antiquity. Although the battle of the Salerno beach raged all around them in the Second World War, the temples of P. escaped all damage. Indeed the war actually helped archaeological interests, for, while digging a gun-emplacement near the site, Brit. troops came upon evidence of a prehistoric cemetery. Regular excavations were subsequently conducted under the auspices of the Neapolitan Museum.

Pæstus, see **THRASIA**, **P. Pæstus**.

Pagan, anct. ruined city of Upper Burma, 92 m. S.W. of Mandalay. From the second century A.D. to the day it was sacked by the barbarian hordes of Kubla Khan in 1284 it served as Burma's cap. It is one of the archaeological wonders of the E. Perched on the 70-ft. cliffs of the E. bank of the riv. stretch the shrines, monasteries, and bell-shaped pagodas of the city which make it a resort of Buddhist pilgrims. There are 5000 of these monuments still standing. The Brit. Fourteenth Army crossed the Irrawaddy near P. in Feb. 1945, in the advance against the Jap. in Mandalay, but fortunately P. was spared the ravages of war. Pop. 7000.

Pagani, Gregorio (1558-1605), It. painter, learnt his craft from Santo di Titi and Lodovico Cordini (Cigoli). A fine colourist, he helped to renew the inspiration of his native school of Florence. The 'Family of Tobit' and some frescoes in the church of Santa Maria Novella, which are his best-known works, are all in that city.

Paganini, Niccolò (1784-1840), violin virtuoso, b. at Genoa, where he studied under Costa; later he worked also under Rolla and Ghisetti at Parma. After an adventurous youth, having put in a prodigious amount of technical practice, he began his actual career when twenty-two years old. Twenty-five years later he toured Vienna, Berlin, Paris, London, and elsewhere, amassing a very considerable fortune. After 1835 he lived in semi-retirement, dividing his time between Parma and Paris (see Berlioz, *Autobiography*), where his gambling propensities led almost to his ruin (1836). He is remembered chiefly for his wonderful technique, his double-stopping and harmonics being unsurpassed, as were also his roundness and beauty of tone in soft passages. But his dissolute and coarse character and general lack of refinement marred the sentiment of his interpretations and precluded him from truly artistic composition. See life by J. Pulver, 1936, and A. Vinogradov, *The Condemnation of Paganini*, 1946.

Paganism (Lat. *paganus*, countryman), word supposed to have been first applied by the early Christians to the country folk who were the last to abandon the anct. beliefs and practices. P. is a form of religion which worships a god or gods other than the One True God of the Christians, Jews, and Muslims, though religious feeling in the Middle Ages led Christians to describe as pagans both Muslims and Jews. P. is in fact identical with polytheism. It is probable that the earliest manifestation of religion was monotheistic and that P. arose from a tendency in primitive man not only to distinguish the divine attributes but to deify natural phenomena. These phenomena are easily recognisable in the familiar deities of Greece and Rome. The anthropomorphic character of the pagan gods led inevitably to the exaltation of human passions. The Jews appear to have been the first to recognise the intimate link between P. and morality, and the

denunciations of their law and prophets are summed up in the magnificent epistle of St. Paul to the Romans. From that time human hist. has been the story of man's loyalty now to the One, now to the Many. Though P. has long been officially abandoned in the W. world it may be said that neither camp has finally rid itself of the influence of the other. The effects of Babylon, Assyria, and Rome failed to destroy the monotheism of the Jews and Christians, though the superstitions of the anct. world are not dead in our time. The influence of P. can be detected in the fierce monotheism of Islam; and the general councils of the E. Church have been mainly concerned to rebut the influence upon its theology of the pagan world. See M. A. Beugnot, *Histoire de la destruction du paganisme en Occident*, 1835; E. de Pressensac, *The Ancient World and Christianity*, 1888; and F. C. Conybeare, *Myth, Magic, and Morals*, 1909.

Page, Sir Frederick Handley (b. 1885), Eng. aeronautical pioneer, and inventor of the slotted wing aircraft. He was one of the early pioneers of flying, and founded Handley Page Ltd. in 1909. In 1908 he joined the Royal Aeronautical Society, and was its president from 1945 to 1947. In the First World War P. designed and built the heavy bomber, the world's first multi-engined aircraft, and in 1919 he was running a civil aircraft service to the Continent. Under his direction Handley Page Ltd. became one of the leading aircraft manufacturers, and comprised 65 per cent of the Imperial Airways fleet when the two concerns were merged in 1924. During the Second World War Handley Page Ltd. produced the Harrow, Hampden, and Halifax bombers, and the Hastings military transport. Among P.'s other designs are W8's, Hannibals, and Hermes. He was president of the Society of Brit. Aircraft Constructors in 1938, and of the Institute of Transport from 1945 to 1946.

Page, Thomas Nelson (1853-1922), Amer. author and diplomat; b. at Oakland, Hanover co., Virginia; practised law at Richmond, 1875-93; was ambas. to Italy, 1913-19. His literary work after the First World War showed an intense admiration of Italy. Pubs. include *In Old Virginia* (1887); *The Old South* (1891); *Marse Chan* (1893); *Pastime Stories* (1894); *The Old Gentleman of the Black Stock* (1896); *The Negro—the Southerner's Problem* (1904); *Robert E. Lee* (1908, 1912); *Life of Thomas Jefferson* (in lt. 1918); *Italy and the World War* (1926). He will live in Amer. literature by his charming sentimental stories of Virginia, in which the protagonists are the plantation owners and their devoted slaves and body servants. He was one of the first and most successful in employing negro dialect. See R. Page, *Thomas Nelson Page a Memoir of a Virginia Gentleman*, 1923.

Page, youth of noble and gentle birth who waits on royal and noble personages. In the days of chivalry, down to the fifteenth century that is, a boy desirous of becoming an esquire and afterwards a knight served an apprenticeship as P.

at court or in the castle of some nobleman. The modern Ps. of honour or Ps. of the presence, etc., who are attached to royal households and who figure on ceremonial and state occasions, are not unlike the *pueri pædagogiani* who served the Rom. emperors.

Pagellus, well-known genus of the acanthopterygian family Sparidae, belongs to the sub-div. *Pagrina*, in which the members have a single series of long front teeth and rounded molars on the sides of the jaw. The species live in the warmer seas; all are carnivorous and many are edible. *P. centrodontus* is the sea-bream, gilthead, or chad.

Pagenstecher, Hermann (1844-1932), Ger. ophthalmologist, b. at Langenschwalbach, Sept. 16, brother of Alexander P. (1828-79), founder of the Wiesbaden Eye Hospital (1857). Educated at Wiesbaden and at the univs. of Würzburg, Berlin, and Prague, in 1868 he was assistant at the Univ. Hospital of Greifswald, and in 1869 at the Wiesbaden Eye Hospital. At his clinic in the Taunusstrasse he received patients from all over the world, effecting many remarkable cures. Queen Victoria, the Empress Frederick, and many other royal persons were among his patients, but he made no distinction between the rich and eminent and the poorest patient, treating all alike with the same degree of skill and care. P. wrote many essays on professional subjects, his *Atlas of the Pathological Anatomy of the Eye* being the best known.

Pages, Louis Antoine, see GARNIER-PAGES.

Paget, Sir George Edward (1809-92), Eng. physician, b. at Great Yarmouth, Norfolk, became a fellow of Caius College, Cambridge, in 1832, took his M.D. degree in 1838, and was made a fellow of the Royal Society in 1855. From 1839 to 1884 he was physician to Aldenbrooke's Hospital, and in 1872 he accepted the chair of physic at his own univ. He will be remembered for the stimulus he gave to the education of medical practitioners.

Paget, Henry William, see ANGLESEY, MARQUESS OF.

Paget, Sir James (1814-99), Eng. surgeon; b. at Great Yarmouth, Norfolk, entered St. Bartholemew's Hospital in 1834. Here he discovered the parasite, *Trichina spiralis*, in the human body, and proved a very brilliant student. In his early manhood he was heavily handicapped by his father's debts; but strenuous devotion to physiology, and especially to pathology, wherein he showed the vital importance of the microscope, soon brought him to the top of his profession as a scientist on the one hand and a surgeon and consulting physician on the other. He wrote *Lectures on Surgical Pathology* (1853) and *Clinical Lectures* (1875). He was resident of the Royal College of Surgeons (1875) and vice-chancellor of London Univ. (1883). See S. Paget, *Memoirs and Letters of Sir James Paget*, 1901.

Pagi Islands, see NASSAU.

Pagoda, Portuguese word, possibly a corruption of the Persian *but-kadah*, which

means an 'idol-house.' It is a term used in the E. for a temple, more especially one pyramidal in shape. There is a very handsome and massive P. at Tanjore, the upper portion being an elongated and elaborately sculptured pyramid 100 ft. in height. The most imposing and, at the same time, the most holy of the Burmese Ps. is the Shwgy Dagon P. at Rangoon. The Siamese *phra* is either pyramidal with a cylindrical turret, or bell-shaped with a slender spire. Unfortunately the marvellous Chinese P., known as the Porcelain Tower of Nanking, was destroyed by the Taipings in 1856. The P. belonging to the temple of Horiuli in Japan has only five storeys; large ones have as many as thirteen.

Pago-Pago, harbour of the is. of Tutuila, Amer. Samoa, which nearly bisects the is. It was ceded to America in 1872 for a coaling station and is now a U.S. naval station.

Pagus Aurelianensis, see ORLEANARY.

Pahang, state of the Federation of Malaya and, formerly, one of the narrower group known as the Federated Malay States (see MALAYA) under Brit. protection. It lies entirely on the E. side of the main range and has 130 m. of its E. border on the China Sea. It comprises 13,820 sq. m. or about half the area of the former federation. The major portion of P. is fairly flat though varied with low hills, but on the S.W., W., and N.W. there is a mountainous chain separating P. from Selangor (q.v.) and Perak (q.v.) and rising to a height of over 6000 ft. in the area called the Cameron Highlands. On the N. range separating P. from Kelantan (q.v.) and Tringganu (q.v.) the highest peak, Gunung Tahan, reaches 7186 ft. The country is fairly well intersected with rivs. and streams, the longest being the P. R. (over 200 m.) which, as the Tolom, rises in the hilly regions of the N.W. and, fed by many tribs., the largest of which are the Tembeling, Jelai, and Lipis, flows first in a southerly direction, through the middle of the state, and thence in an easterly direction, and has its outlet at Pekan on the E. coast. The state includes the is. of Tioman, some 25 m. off the coast in the China Sea. The seat of gov. is at Kuala Lipis. The sultan resides at Pekan, near the mouth of the P. R. The country is rich in gold, tin, and galena, and produces fine specimens of mats, buckets, etc., woven from pandanus fibre. The dynasty that once ruled P. was descended from the rulers of the royal house of Malacca and before that house became extinct in 1699 its P. branch provided many rulers for the older throne of Johore, which directly represented the Malacca dynasty (see MALAYA, History). Thereafter P. came under the suzerainty of the new sultans of Johore who, when they removed to Ithio and Lingga (is. states S. of Singapore), left a member of their own house as *dato' bendahara* in charge of P. In 1887 Sir Frederick Weld negotiated a treaty with the bendahara, promising Brit. help in the event of external aggression and arranging for a Brit. agent to be stationed at his cap. At the same time the title of sultan was

substituted for bendahara. In 1888 the sultan applied for and obtained Brit. protection, and the appointment of a resident. P. was invaded by the Jap. in Jan. 1942 and the Brit. forces, outnumbered, withdrew from the Kuantan area (Jan. 6) after flooding the large P. Consolidated tin mine. Area 13,820 sq. m. Pop. 221,800.

Pahari, see under INDO-EUROPEAN LANGUAGES.

Pahlavi (tn. see ENZELI; PEHLEIR.

Pahlavi, Middle Persian, or Middle Iranian, terms employed for the dialects and scripts used in the ter. of Persia, or Iran, under the Arsacid and Sasanian dynasties (see PERSIA, *Language and Literature*). The term P., which is a phonetic modification of *Parthavi* or *Parthava*, as on the inscriptions of Darius, meaning 'Parthian' (Gk. *Parthiyanos*, Lat. *Parthi*), does not indicate that P. was the language of the Parthians, but that both the speech and the script developed in Parthian times, i.e. when Parthia dominated Iran, and Iranian and Parthian became practically synonymous terms.

Alexander the Great's conquest of Persia in 331 B.C. not only put an end to the Achaemenian dynasty of Persia and to its script (cuneiform writing, q.v.), but also dealt a heavy blow at its religion (Zoroastrianism), its language (Old Persian), and its national culture. In the troubled years which followed the collapse of Alexander's empire there arose the Arsacid dynasty of Parthia, while the language of Persia had undergone considerable modification and new scripts were devised. The ultimate decline of Parthian power helped the renaissance of the Persian national spirit, which found expression, in A.D. 226, in the founding of the Sasanian dynasty: while the Arsacid dynasty was considered to be foreign, the Sasanids rated themselves as a national dynasty, and its founder, Ardashir or Artakshir (in grecised form, Artaxerxes), traced his descent from the Achaemenians. The Sasanids, following the tradition of their great 'ancestors,' immortalised their deeds in rock sculptures, and inscriptions written in P. Until the Arab invasion of Persia there must have been considerable production of P. literature, particularly on subjects connected with Zoroastrianism. The destructiveness of the Muslim conquest and the imposition of the Arabic alphabet on the newly converted Persians account for the fact that comparatively few P. works have survived. For this survival we are indebted to the Persia, the descendants of the Persian Zoroastrians, who were compelled to flee to India in the eighth century A.D. The survived books owe their preservation to their religious character or to their connection with the Avesta (i.e. the Zoroastrian sacred literature), written in an Old Persian dialect, now called Avesta, and in a most cursive script (probably of P. origin) of fifty signs, also termed Avesta. The book Avesta is invariably accompanied by the Zend, which is the traditional commentary of the Avesta, and is written in P. While the origin of the P.

forms of speech is more or less clear, being a natural development of Old Persian dialects, it is far from clear how the P. systems of writing developed. They cannot have been creations of an individual, because in that case the P. script would have been more consistently worked out, and the almost contemporary appearance of two or more varieties would be inexplicable. It may, therefore, be assumed that the P. scripts were a natural development from local cursive Aramaic scripts (see under ALPHABET). At least three varieties of the P. alphabets are distinguishable: (1) The N.W. P., termed also Pahlavik or Arsacid, the script of the Parthians; it appears on coins and gems of the Arsacid dynasty; (2) the S.W. P., termed also Parsik or Sasanian, the script of the Persians proper; it appears in two forms, monumental (on the Sasanian inscriptions) and cursive (of the P. books); (3) the E. P., of which only a cursive form is known.

Paiforce, officially the Persia and Iraq Command, a force which came into existence in April 1941 at about the time of the Iraq rebellion (see IRAQ, *Revolt (1941)*), its purpose being to check a possible move by the Nazis to conquer the Middle E. In the nature of things, thus early in the war, large forces could hardly be created by the Allies at a moment's notice, and the nucleus of P. was a single brigade and a field regiment of Royal Engineers. The force expanded and contracted according to military exigencies and, again, according to exigencies, changed its role. After Syria had been occupied by the Allies and Iraq recovered, P. went into Persia and prepared to meet a Ger. attack either through Turkey or via the Caucasus or both. When that threat had vanished, P. became the indispensable link with Russia, and responsible for the deliveries of war material to the Red Army. This Russian 'lift' was in fact the chief achievement of P., and a triumph of human resolution over difficulties, physical and moral, by a force that comprised men of many nations all from their homeland, and exposed to rigours of climate, hardship, and boredom. Their story is told in a Stationery Office book (with illustrations) issued in 1949.

Paignton, tn. of Devonshire, England, on Tor Bay, 2½ m. S.W. of Torquay. Among its places of interest are the remains of the bishop's palace, once the residence of Miles Coverdale. This tn. is a popular seaside resort, and has excellent bathing facilities. Pop. 25,200.

Paibo, see PEIBO.

Paiken, Paraire Karaka (1894-1943), New Zealand (Maori) politician and Methodist minister. He was a minister of the Methodist Church from 1915 to 1925. In 1938 he was elected a Labour member to the New Zealand House of Representatives, and after the war broke out was made minister for native affairs (1941) and later minister in charge of the Maori war effort.

Paille Maille, see MAILLÉ, THÉ.

Pain, Barry Eric Odell (1864-1928), Eng. humorous author, b. at Cambridge.

He was educated at Sedbergh and Corpus Christi College, Cambridge. A story of his, entitled *The Hundred Gates*, appeared in the *Cornhill* in 1889. After leaving college he went to London, took to literature as a profession, and became known as a clever and humorous writer of fiction. His works include *Eliza* (1900); *Eliza Getting On* (1900); *The Memoirs of Constantine Dic* (1905); *Wilhelmina in London* (1906); *The New Gulliver* (1913); *Me and Harris* (1916); *The Problem Club* (1919); *If Summer Don't* (parody of *If Winter Comes*) (1922); *Dumphry* (1927); and *The Later Years* (1927).

Pain, see under EMOTIONS; FEELING; THERAPEUTICS; TOUCH.

Paine, Thomas (1737-1809), Eng. author and politician, the son of a small farmer



THOMAS PAINE.

at Thetford, Norfolk, became an excise officer in 1761, but, agitating for the removal of grievances, was dismissed from the service. In 1774 he went to America with a note of introduction from Benjamin Franklin, and two years later pub. *Common Sense*, in which he discussed the causes of the war with England. He held various posts in the Amer. Army and under the Amer. Gov. until 1787, when he returned to England. In 1790, in reply to Burke's *Reflections on the French Revolution*, he pub. the first part of *The Rights of Man*, and when two years later he issued the second part he had to flee to France to escape prosecution. He was at once elected a member of the Convention, in which (1793) he opposed the execution of Louis XVI., and was imprisoned until the death of Robespierre. He pub. *The Age of Reason* in 1793. He went again to America in 1802, to find neither welcome nor even charity, and died seven years later in New York. His writings were forcible enunciations of the abstract rights of men, and were highly regarded by the Radical party in England. See lives by E. Sedgwick, 1900; M. A. Best, 1927; C.

Cohen, 1945; W. E. Woodward, 1945; H. M. Fast, 1946; and J. Dos Passos, 1948.

Painesville, co. seat of Lake co., Ohio, U.S.A., 30 m. N. of Cleveland, on the Grand R.; 3 m. to the N. of the city is the best harbour on Lake Erie, affording excellent trading facilities. Nursery gardening is carried on, and the industries include the manuf. of motors. Pop. 12,200.

Painlevé, Paul (1863-1933), Fr. statesman, b. in Paris, was successively prof. at Lille Univ. and the Sorbonne, and in 1904 prof. of mechanics and engineering at the Ecole Polytechnique. He wrote a book on aeronautics, which is recognised as a classic, and founded the Fr. Air League. A deputy in 1906, as chairman of the Navy Committee he initiated the policy of concentrating the Fr. fleet in the Mediterranean and thereby promoted the development of the Entente Cordiale; minister of public instruction, 1915, and war minister, 1916, he was responsible for appointing Pétain, with Foch as chief of staff, to succeed Nivelle. Prime Minister, for a few months in 1917, he was defeated as a candidate for the presidency in 1924, but became Prime Minister again in 1925, and also finance minister. He wrote many philosophical and scientific works, including a book on the analytical theory of differential equations. See life by E. Charles, 1925.

Pains and Penalties Bill, see ATTAINDER.

Painted Lady (*Vanessa cardui*), butterfly of the family Nymphalidae, migrates to Britain from N. Africa. The caterpillar breeds on thistles and other plants.

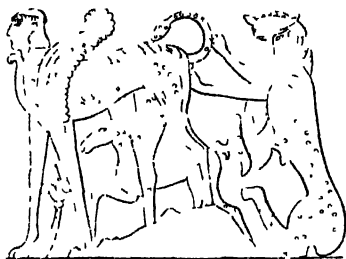
Painter's Colic, see COLIC; LEAD POISONING.

Painting, in art, may be defined as the imitation or representation of objects by colour laid upon a uniform surface.

PRIMITIVE MAN.—Primitive paintings, largely to secure food by magic intent, were made by Palaeolithic man on the walls of his caves. Cave-paintings in France and in Spain are of special interest. These Ps., executed in little more than red and black, as records of animals in movement and as drawings, have never been surpassed. The artists had remarkable qualities of vision, feeling for mass, rhythm, and expressive line. The drawings, while near perfection in themselves, are scarcely related to each other. Possibly they were made for religious as well as for magical purposes, and to convey practical information in connection with hunting and possibly also because to make them gave pleasure to the artist. Their strength and delicacy, feeling for line, tone, and movement, make a curious link with the sophisticated nineteenth-century painter Dogus.

PAINTING IN ANTIQUITY.—In primitive form the existence of this art may be traced among the earliest known civilisations, as in Babylon, Egypt, India, Mexico, and Greece. Painted tiles, bas-reliefs, and statues have been found. Historical wall-paintings, especially on the walls of tombs, were common among

many early races. The wooden cases of the Egyptian mummies were brilliantly coloured, as may be seen from the specimens in the Brit. Museum, and the Ps. on the walls of the Etruscan tombs are also famous. There is some ground for believing that the art of P. in Greece may have been brought to the same degree of perfection as the arts of sculpture and architecture, though probably lacking in any feeling for perspective, linear or aerial. It was not an independent art in its beginnings, but subservient to sculpture, architecture, or primitive engraving. Hard and definite linear drawing filled up with colour marked the first attempts in the grand art which has since been developed both technically and intellectually to express infinitely more than mere outline. Egyptian art was intended more as a decoration, a record, and a symbol



ETRUSCAN PAINTING

A drawing from Etruscan painting. It shows a sphinx, panther, and deer (or deer), and was painted, with dazzling effect, in red, yellow, and black.

than as an imitation of nature, and probably Assyrian and Babylonian Ps. had the same aim. Later on a faithful representation of nature became one of the most important results the painter desired to achieve; while according to modern ideas something far higher and more elusive than mere resemblance to, or imitation of, external nature—the delineation of the inner soul by the artist's sympathy and insight, must be added to beauty of composition, arrangement, and detail to constitute a truly great picture. The Egyptians apparently knew a variety of pigments, while the Gks., at least till the time of Apelles, used mainly four—white, red, yellow, and black (perhaps including blues). The designs on Gk. vases and pottery are the prin. means left to us for forming any estimate of the art of P. among the Gks. The discoveries at Mycenae, Croton, round the Aegean, and elsewhere by Sir Arthur Evans and others have also made important additions to our knowledge. To Cimon of Cleone (c. sixth century B.C.) was ascribed, among other innovations, the introduction of 'cata-grapha' (foreshortenings) and an attempt to apply the rules of perspective. Polygnotus of Thasos, who settled at Athens about 563 B.C., was one of the greatest

masters of antiquity, and was praised by Aristotle, Pliny, and Pausanias. To his 'Athenian school' succeeded those of Ionia and Sicily, among the chief names being those of Parrhasius, Timanthes, Zeuxis, Pampylus, and Apelles (fifth and fourth centuries B.C.). The remains of early Rom. art are more abundant. After the sack of Corinth by Mummius (146 B.C.) many fine works of art were brought to Rome and exhibited. Valuable wall-paintings have been excavated from the ruins of Pompeii, the baths of Titus, and other noted buildings in Rome.

The introduction of Christianity marked a new period in the hist. of P. With it the purely decorative representations of mythology were superseded by the symbols of Christianity. Pictorial expression was made to serve a double end—that of commemorating Christ's Passion, and of keeping the truths of the Christian faith alive in the hearts of the early catechumens. Thus in the catacombs one finds constant repetition of symbols such as the Lamb, the Good Shepherd, and others, which, while being purposely unintelligible to the uninitiated, held for the initiate encouragement and hope. Later, after the official estab. of Christianity, in the reign of Constantine, the great pagan basilicas turned into Christian churches were decorated with mosaics, mostly of a symbolical character, or with figures of the Trinity and the saints, such as are to be still seen in the churches of S. Maria Maggiore, S. Giovanni Laterano in Rome, and those of Ravenna (see under separate ins.). To this period belong also sev. illuminated MSS. and images after the style of the Russian *ikons*, all of which betray Byzantine influence and manner of expression. After the eighth-century fresco P. was introduced, and took the place of the mosaics, and while abiding a wider scope to the imagination, continued for some time to be tied down by the old tradition, both in composition and in design.

MIDIEVAL PAINTING. —From the Carolingian period till the twelfth century Germany was the chief European centre of art, followed in 1150 by France and in 1250 by Italy. The Gothic influence, full of refinement and tenderness of feeling, and characterised by a return to nature, which contrasted violently with the formal shapes of Byzantinism, dominated the whole art of this period, as is testified by the numerous Ps. on wood and glass, the illuminated MSS., frescoes and engravings still extant.

Early Italian Schools. —The revival of art in Italy and the reaction against the Byzantine tradition commenced with the panel Ps.: the painted crucifixes with black outlines, stiff, contorted, and hard, with a great use of blues and greens in the flesh tints, are rather hard in appearance. The first sign of a new life was given by Nicola Pisano in his realistic alto-relievs at the baptistery of Florence and at Pisa, and was followed in P. by Pietro Cavallini at Rome, Innocenzo di Buoninsegna at Siena, and Cimabue at Florence (1253-1315). The first great It. painter of this period,

however, is Giotto, at Florence (1267-1337), who introduced the natural and dramatic treatment of sacred subjects, and greatly developed the science of composition and colour. With his frescoes at Assisi, in the church of S. Croce in Florence, and at Padua, this medium attains the loftiest heights. Fresco P., in its true sense of P. on fresh (still wet) plaster, is believed to have been one of the earliest forms of P. known and practised. The term is often loosely used, however, to express P. on dry plaster as well. A characteristic of true fresco is the permanence of its colours. This process was largely used for mural Ps. in churches. The designs and figures were painted from sketches or cartoons or entirely from the imagination. The influence of Giotto dominated the Florentine school until the end of the century, and was instrumental in the forming of the famous Painters' Company in 1349. The other prin. painters of this school are Andrea Orcagna (see Pisa), Taddeo (addi, Spinello Aretino, and others. Parallel to the Florentine school a fine body of painters, headed by Simone Martini (1283-1344), formed the Siena school, which is characterised by a pensive sweetness of expression, devout feeling, and decorative charm, and founded the Company of Painters (1355), among whom Lippo Memmi and the Lorenzetti were the most conspicuous members. The medieval Tuscan painters end with Fra Angelico da Fiesole (1387-1455), who, in his wonderfully inspired altar-pieces and frescoes in the convent of S. Marco in Florence (see FLORENCE), brings religious art of this period to its highest expression. The other parts of Italy were affected much later by the Tuscan revival.

The Fifteenth Century.—The schools of the early It. Renaissance can be roughly classed under four prin. divs., viz. Florence, Siena, Umbria, and N. Italy, divided into Verona and Venice. *Florence.*—The two greatest painters of Florence are Masaccio (1402-29), who developed and perfected Giotto's ideas, and Sandro Botticelli (1444-1510), who is the true representative of the humanistic spirit, and realised, in his Ps., an extraordinary feeling for beauty and the power of 'tactile values.' With these are closely connected Filippino Lippi (1466-1505), Benozzo Gozzoli (1428-1498), Piero di Cosimo, and Cosimo Rosselli, all of whom represent the popular side of the P. of this century, as opposed to the more academic and formal in Paolo Uccello (1397-1475), who first carried perspective to any perfection, Andrea del Castagno, Alessio Baldovinetti, and Antonio Pollaiuolo (1429-98). To these one must add Verrocchio (1435-88), master of Leonardo, Giulianajo (1449-1494), Fra Bartolommeo, and Andrea del Sarto. *Siena.*—This period marks the decline of the Sienese school, the only interesting representatives being Taddeo Bartoli, Sano di Pietro, and a few others. *Umbria.*—Gentile da Fabriano (1378-1460), Piero della Francesca (1416-92), Melozzo da Forlì (1438-94), Luca Signorelli (1442-1524), Pietro Perugino (1446-1524), and Giovanni Sanzio, father of

Raphael, develop all, in different ways, that peculiar quality of suavity, softness, and tender beauty which is characteristic of the Umbrian school of painters, and which influenced considerably the art of the Renaissance. *Northern Italy.*—Padua: Andrea Mantegna (1431-1506); Bologna: Francesco Francia (1450-1517); Venice: Antonello da Messina, who is said to have introduced oil P., Cima da Conoglian, Carpaccio Gentile (1429-1507) and Giovanni Bellini (1430-1516), who have a beauty of colour and design which preludes the advent of the High Renaissance.

The Sixteenth Century.—This is the period of the great It. masters. At Florence, Leonardo da Vinci (1452-1519), Michelangelo Buonarroti (1475-1564), Sebastiano del Piombo (1485-1547), who overshadowed and modified the whole of It. P. In Umbria, Raffaello Sanzio (1483-1520), Giulio Romano (1492-1546); Bernardino Luini (1465-1540) at Milan; Correggio (1494-1534) and Parmigianino at Parma; Moroni at Bergamo; Giorgione (1477-1510), Lorenzo Lotto (1480-1556), Palma Vecchio (1480-1528), Titian (c. 1477-1576), Paolo Veronese (c. 1528-88), and Tintoretto (c. 1518-94) at Venice. The discovery of oil P. and the use of varnishes during the progress of the work is commonly assigned to the Van Eycks in the early fifteenth century, and this process was introduced from Flanders into Italy by way of Venice, Florence, and Naples. It soon became the favourite medium, as needing less speed and decision than fresco and admitting of retouching and correction.

The Seventeenth Century.—As the Renaissance gradually made its influence felt, a far larger variety of subjects suggested themselves for representation. This influence spread over the whole of Europe and affected the painters of all nations. Among the most important one may name Annibale Caracci (1580-1620), founder of the Eclectic school at Bologna; Guido Reni (1575-1642); Domenichino; Sassoterrato; Caravaggio (1567-1607), one of the best painters of the Naturalist school; Ribera; Salvatore Rosa; and at Venice, Paris Bordone, the Bassani, Padocaulino (1590-1650), G. B. Tiepolo (1692-1769), the It. Watteau, Canaletto, and Longhi, the latter two almost exclusively painters of Venetian scenes.

British.—Though Brit. art made a beginning in early times, examples of P. being found in Gothic cathedrals, glass P., and miniatures, foreign artists were largely employed by the sovereigns up to the sixteenth and seventeenth centuries. The finest native work is found in the miniature Ps. of Hilliard, Oliver, Jameson, and Walker (portrait painters).

The Fourteenth-Eighteenth Centuries in Germany, Holland, and Flanders.—Germany: One of the earliest Ger. painters is Wilhelm of Cologne (d. 1378), from whom the Gothic tradition was handed down in uninterrupted succession by Martin Schongauer, who is the first Ger. realist, Albrecht Dürer (1471-1528), Lucas Cranach (1472-1553), Mathias Grunwald (1476-1530), Hans Holbein (1497-1543),

who developed and modified it. At the end of the sixteenth century Ger. P. seems to die out completely. *Flanders*: The first great artists who emerge are Hubert and Jan Van Eyck, followed by R. Van der Weyden (1395-1449), Hans Memling (1430-94), Hugo Van der Goes (1435-82), Quintin Matsys, Brueghel, Mabuse, and Peter Paul Rubens (1577-1640), who was one of the greatest painters of his time; Anthony Van Dyck (1593-1641), Teniers, Snyders, Brouwen, whose works exerted a very wide influence on the further

Spain.—All the early Sp. schools are marked by It. influence, and were little known outside Spain. It was only in the seventeenth century, with Velazquez (1599-1660), El Greco, Murillo (1617-81), Alonzo Cano (1601-87), and later Ribera (1588-1858) and Zurbaran (1598-1662), that Sp. P. became doubly famous, on account of the new style it exhibited, and for the influence which it has exerted on modern European art.

THE MODERN SCHOOLS, 1600-1900.—From Rembrandt and Rubens, from the



SIR ANTHONY VAN DYCK: 'THE CHILDREN OF CHARLES I.' SEVENTEENTH CENTURY
Turin Gallery.

developments of Flem. art. *Holland*: The Dutch school, which during the early centuries had few representatives of any note, with the exception of Lucas van Leyden (1494-1533), in the seventeenth century takes a sudden leap forward with Rembrandt (1606-76), whose followers make a considerable school. Franz Hals (1580-1666) and Van der Helst (1613-70) develop their own, and are followed by a tribe of painters in *genre*, such as Ter Borch, Metsu, Van Steen (satirical), Van Meer, Van Ostade, Wouwerman; landscape painters, Van der Velde, Ruysdael, and Hobbema, and painters of still life, cattle, and lands, such as Cuyp, Potter, A. Van der Velde, J. Van der Heyden. To these who express art of an essentially national and local type may be added a school of so-called 'Romanists,' such as Jan Both, Van Mieris, and Van de Werf, who were largely affected by It. influences.

Venetian and Florentine schools of the Renaissance, one can trace the descent and the development of modern art.

England.—Modern Eng. art begins with Hogarth (1697-1764), directly influenced by the Dutch school. The emphasis is on figure P. and portraits. Gainsborough (1727-88), Reynolds (1723-92), Romney, Lawrence, and Raeburn are influenced by Van Dyck. With Gainsborough landscape starts to detach itself as a separate branch of art, and Wilson, Crome, Turner (1775-1851), Constable (1776-1837) raise it to magnificent heights. Parallel to this runs a school of water-colour P. unique in European art at the time. A. Cozens, J. R. Cozens, Turner, Girtin, and Cotman. Stubbs, the animal painter, is a lonely figure and notable craftsman in oil P. Rowlandson, heir to Hogarth, uses water-colour drawing superbly. Standing apart from the main stream Blake, the

post-painter, also relies on water-colour drawing, metal engraving, and wood engraving. Reaction to the tired convention of the eighteenth century in figure composition comes with the Pre-Raphaelite Brotherhood: Millais, Holman Hunt, Ford Madox Brown, under the leadership of Rossetti. Relying chiefly on literature for subjects, they sought out living models and actual backgrounds which they painted from directly. Associated are A. Hughes, Burne-Jones, Wm. Morris and others, and Watts and W. Crane. This movement had a powerful effect on Eng. book illustration in the second half of the century.

A new direction was given to P. by the Amer. J. McNeil Whistler, Paris trained, whose work reflects interest in the tonal P. of Velazquez and the decorative effect of the Jap. print—destined to be a great inspiration in France and England. Mention must be made of a Scottish school: Orchardson, Lavery, MacWhirter, etc., and of Sargent, the portrait painter, Nicholson, and Fryde (also known for their posters as the Beggar-laff brothers), and Beardsley (book illustration) and Beerbohm (caricature), associated particularly with the nineties.

France.—In modern P. one can distinguish two great influences, both It., one Florentine and the other Venetian. The figure painters of the age of Louis XIV. followed very closely the methods of Raphael, as may be seen in Lebrun (1619–1690) and others, as also, later, David, Ingres, Delaroche, Laurens, and Delacroix during the nineteenth century. The landscape painters, on the other hand, were more closely allied to the Venetians. Such were the great masters of the seventeenth century, Poussin (1594–1665), Claude (1600–82), and afterwards Watteau (1684–1721), Boucher, Fragonard, Chardin (1699–1779), Greuze (1725–1805), Corot (1796–1875). The latter, with Millet (1814–75), Rousseau, Daubigny, and Monticelli, were influenced by the poetical Impressionism of Turner and, as in England, gave rise to a sort of romantic revival, in antagonism to the realistic schools of Bougereau, Cabanel, Courbet, and Manet. Of these Gustave Moreau, perhaps the greatest, and Pavis de Chavannes are the best.

Germany.—At the end of the eighteenth century a classical reaction set in against the neo-classicism, headed by A. M. Carstens, pioneer and founder of New Ger. art, Rafael Mengs, and A. Kauffmann, based on the teachings of Winckelmann on Gk. art. To these were opposed the so-called 'Nazarenes,' who represent a national romantic art, led by Cornelius, Kaulbach, and Overbeck. Steinle, the Viennese, is a representative of the group. Schadow formed a Düsseldorf school, and was followed by Rethel and the Viennese Schwind. Under the influence of Fr. and Dutch art, Feuerbach and Piloty founded the powerful Munich school. As in France and elsewhere, so in Germany, the need for a completer expression was felt, and gave rise to idealism as expressed in Becklin, Maries, Schwind, etc.

In other countries one cannot trace

the individual developments so closely. *Holland:* Modern Dutch art revived through Fr. influence in Israels and his contemporaries, Mesdag, Bisschop, Neuhuys, Jongkind, Mauve, and the brothers Maris. Later artists are Bauer, Van Looy, Prikker, and Tholen. *Belgium:* Modern Belgian art begins with Boulenger who founded the Terouwen school, including Buron, Hoymans, Claus, Marie Collaert, and Clays. Flem. painters are Meunier and Da Groux. Stevens, Dubois, Stobbaerts, and Khnopff are also well known. *Spain:* Goya is the only important artist of the eighteenth century, and modern art arose with Fortuny. The chief modern painter is Pradilla. Other distinguished names are Gaudara, Zuloaga, and Sorolla. *Italy:* The most striking figure is Segantini. Painters influenced by Fortuny are Morolli, Michetti, Dalbano, and Fuceto. Nature painters are Costa, Tito, Belloni, and Fracagomo, the best water-colour painter of Italy.

The Scandinavian countries form a group of their own, which has to be dealt with separately. *Denmark:* There is a close kinship between Dan. and Dutch art. Only in the seventeenth century, under Christian IV., was the cultivation of art begun at all seriously. Under Frederik V. (1746–66) the Academy of Art was founded. Among these early painters may be mentioned Jens Juel, Gebauer, Abildgaard, Witt, Eckersberg, Sorme, Marstrand, Vermehan, Bloch, Helsted, Tuxen, Johannsen, and Paulsen. Dan. P. gradually evolved, and principally dealt with home and national life. Among the twentieth-century Dan. painters special mention should be made of Paul S. Christiansen, Fritz Syberg, J. F. Willumsen, Harald Giersing, the two brothers Joakim and Nils Skovgaard, Nolla Larsen Stevns, Edvard Weie, Olaf Rude, and Knud Agger. *Sweden:* Much more advanced than her sister country, Sweden was greatly influenced by Fr. and Ger. art. Among the earlier painters are Haecker, Rosen, and Kruberg; and among the moderns Bergh, Hagborg, and Andreas Zorn. *Norway:* The P. of Norway reflects the temperament of its people. Among the early painters are Johann Kristen Dahl, H. F. Gude, Adolf Tidemand, the greatest painter of national life, Ludw. Munthe, and others. Under the influence of Fr. Impressionism Edvard Munch is outstanding. Later names include Eriksen, Kertsen, Solberg, Astrup, and Svastad. Moderns include Jørgensen, Johnsen, Aulie, Jell, and Egeland.

Russia.—The early Russian art properly belongs to the E. rather than the W. Only within recent years has a national school grown up in Russia; the earlier painters were all greatly under the influence of the Fr. schools. To give a few names, Kuindshi (the creator of the open-air school), Makowsky, Repin, Bogachevsky, Kramskoi; and among the more recent, Stelletsky, Roerich, and Bennis, to which may be added a large Impressionist school.

United States.—Modern art can be divided into two periods, colonial and revolutionary. The first includes Brit.-

Amer. painters, such as Copley, West, Lesley, Newton; the second, dominated at first by Eng. influences, are later considerably affected by It. influences. Among these may be included Trumbull, Gilbert Stuart, Alston, and Sully, who is the most eminent. Indigenous art begins about 1825 with the landscape painters, Thomas Cole and those of the Hudson R. school, and others, Bierstadt, Sandford, Richards. The prin. foreign influences were those of the Düsseldorf school (Leutze) and the Fr. (Bicks, W. H. Hunt). Among the prin. figure painters, John La Farge, Winslow Homer, George Fuller, etc. With the Centennial Exhibition in 1876 a new phase of Amer. art commenced, characterised by the strong influences of modern European P., especially of such art centres as Munich and Paris, the former predominating. Among the best may be mentioned W. M. Chase, Kenyon Cox, Wilce, Blashfield, Turner (figure and genre), Lockwood, Tarbell, Vinton (portraiture), Weir, Robinson, and Horatio Walker (landscape).

NEW MOVEMENTS (1870-1931).—France for the last sixty years has been the active centre of European P., and the successive movements which arose there, although greeted at the time with opposition and comic nicknames, came later to be treated seriously, under these same rough-and-ready names, by critics and historians. Some confusion has resulted, as when Braque, who is a quiet colourist, is labelled 'Fauve,' i.e. wild beast: but no other system of naming is in common use. The order of appearance of these various -isms, and their relation to one another, is as follows.

Turner in England had already evolved his own form of Impressionism (q.v.) in which the disintegration of forms by light had brought P. to the borders of the abstract. In 1870 (following Turner's example) two Fr. painters were confirmed in the direction that they had taken, acting on the hints already given by Corot, Delacroix, and Watteau. They were inspired considerably by the recent scientific researches on colour and by photography. So the first exhibition (1874) embodied two main principles: (1) Landscape, done out of doors, was treated as a single vision seen in a flash, not as a collection of separate objects seen successively. (2) The use of spectrum colours and of 'complementary' colour to give a more vivid interpretation of light, i.e. the shadows on a stone, instead of being a deeper stone colour, would be green or violet, according as the light which fell upon the stone tended in itself to be red or yellow. Claude Monet's work is one example of this approach. Monet's Impressionism depends more on a free sketch, handling of the brush, and loose treatment of forms due to quick work in the face of nature. Picasso also practised for a time a severe form of Impressionism under the influence of Seurat's *pointillisme* (1886). This consisted in laying spots of pure colour side by side on the canvas so as to blend when seen at the right distance. But this proved too mechanical, and

with the general loosening of shapes and slowness of design provoked a reaction. Renoir and Degas both turned their backs on this form of Impressionism. Renoir, who left enchanting works while still under the inspiration of the new-found methods, turned to a solid treatment of form with rich glowing colour recalling the Venetians and Rubens, while Degas, retaining much of the love of light effect, felt himself to be first a draughtsman and urged his colleagues to consider new combinations of drawing rather than colour. These two great painters stand out by reason of their superb draughtsmanship, lovely colour, and sound picture making—Renoir with his lyrical enthusiasm for flowers, sunny landscape, and women, Degas with his passion for figures in movement and his original composition.

The Post-Impressionists (q.v.), innovators in their separate ways, brought back a feeling for rhythm and pattern, line and silhouette. Cézanne in particular wanted a return to solid and secure picture-making. He realised that there must be a balance between designing in the second dimension and in the third. Shapes must suggest weight and solidity and be welded together in a more architectural treatment. All this had to be done by means of patches of perfectly related colour which neither denied the colour of light or the local colour of objects. His later work, however, foreshadows the abstract painters of the twentieth century. Van Gogh, too fiery to be content with Seurat's method, evolved a violently linear method of drawing in paint with bright coloured lines laid on flat bright areas of colour, with an almost complete absence of shadow effects. Gauguin in the S. Seas found the subjects he needed for his rich decorative treatment of shapes by silhouette and local colour.

Fauvism (1906) arose from a feeling that previous movements were exhausted. Matisse produced a shorthand system of colour and drawing which, emptying out all photographic influence, makes excellent decoration. It looks spontaneous, but is the result of study and knowledge. Of the others (who included Utrillo, Friesz, Dufy, Segonzac), Picasso, Braque, Derain went on to Cubism (q.v.). The nature of Cubism and the many phases make it difficult to describe in words. Study of Cézanne's later method led to a splitting up of forms into separate planes, to geometrical essentials, to something crystalline. These planes are recombined so that an effective design transpires, but the original recognisable form frequently disappears. The partly recognised form is probably the chief cause of annoyance to those who do not understand Cubism. Periods of analysis and mathematical abstraction followed. Designs in superimposed layers of coloured or patterned papers, small objects fixed to the surface, with drawing and P. linking these effects together. In 1931 Picasso, Léger, and Ozenfant each had their own following. In Italy Futurism (q.v., 1911) was a

protest against classic calm as seen in the dead atmosphere of museums. Violent action was to be painted—an aim more suited to the cinema. Marinetti's poems gave it a flying start and Severini's decorative sense survived both this and Cubism; but the attempts by Hilla to show successive movements on the same canvas now seem curiosities. Expressionism (*q.v.*) arose independently in Germany about 1906. The emphasis is on feeling rather than form. Kandinsky (a Russian), Franz Marc, and Paul Klee founded a group while influenced by Picasso. Kandinsky's art is a compound of Cubism, Ger. Mysticism, psycho-analysis. Klee, an early surrealist, has a feeling for

and bourgeois scenes in a naive style which is poetical and decorative. Vuillard and Bonnard have remained faithfully to the portrayal of quiet domestic life in bourgeois surroundings—Vuillard a lovely colourist with a strong feeling for pattern, Bonnard more a follower of Renoir and his glowing colour. Both have continued unshaken by Cubism. Bonalt, a designer of stained glass originally, portrays the horror and agony of life in his tragic figures and faces. His style is violent, even brutal.

The F1 artistic movements which may arise from discussion in restaurants and cafes are seldom found in England. Impressionism, however, found a footing at



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PAUL NASH THE MINN ROAD, 1913

pattern and the patterns of peasant art. He once described one of his pictures as 'taking a walk with a line'—a fair enough description of many of them. Georg Grosz in his scenes of night life reveals the hysteria prevalent in Germany after the close of the 1914-18 war.

Surrealism (1925) chiefly consists in the relating of forms seldom found together in everyday life, and to give the impression of a dream-world or a nightmare. Its chief value has been to explore the 'unconscious,' but it is an art liable to be used merely to astonish the spectator. Dalí remains its most striking exponent, but as a movement it has now shot its bolt. But Chirico in 1913 was already doing remarkable Ps. of classical landscapes, buildings, horses on the seashore. Since then he has repudiated his early work. Dadaism was the final expression of frustration after the first World War, but left nothing noteworthy. Henri Rousseau stands apart as a genuine modern primitive. An official in the customs, he painted at week-ends jungle

the Grosvenor Gallery Exhibition of 1877, and later in the New Eng. Art Club (1886), which also reflected the revival of drawing centred in the Slade school. The N.E.A.C. has included John Sergeant, the Amer. portrait painter, W. R. Sickert, a link with the Impressionism of Whistler and Degas, who painted with gusto racy or drab subjects, Augustus John, a great Romantic artist and brilliant draughtsman famous for portraits and for compositions of gipsy life. Wilson Steer, O.M., whose Impressionism derived originally from France returned to the Eng. tradition of Constable. The first Post-Impressionist exhibition in England was held in 1910, created an uproar, and gave a great impetus to many Brit. painters. Duncan Grant is an example with his robust treatment of solid forms in resonant colour. The war artists of 1914-18 also did striking work in the new idiom. C. R. W. Nevinson relied on a sharp geometrical style and a reduction of forms and the near-abstract. Edward Wadsworth did something similar in his own

style. Wm. Roberts interprets natural shapes rather in terms of machinery, his pictures being meticulously organised. Henry Lamb, Eric Kennington, Stanley Spencer, with his highly personal vision continuing a vein of Pre-Raphaelism, and the brothers Paul and John Nash are all associated with this period. Paul's formal structural Pa. show cubist influence. He was the moving spirit in 'unit one,' a group 'devoted to design as a structural pursuit,' while John's water-colour landscapes are notable for economy of means and cool planning. Wyndham Lewis was one of the few Eng. artists to be directly affected by the Cubist movement; he remains a powerful influence to-day (1950) with a flourishing school of P. under his wing. He was the founder of the 'Vorticists,' who had as their mouthpiece a pub. entitled *Blast*. His style is intensely virile and his drawing highly idiosyncratic. Later formations were the Camden Town group (1911) and the London group (*see above*).

The period between the world wars produced many promising painters. Edward Bawden and Eric Ravilious both continued a fine tradition of Eng. water-colour drawing with gaiety and humour. Many young painters found effective scope for their topographical P. as war artists or in recording Britain. The war artists were better as recorders of the way things looked than in giving expression to the way people felt. But a few were able to convey something deeper, notably Graham Sutherland and John Piper, who did bring out the horror and the devastation of war. For this they were well equipped by a style that goes far towards the abstract. But Eng. traditional water-colour painters such as Samuel Palmer have also helped to form their style. The drawings of Henry Moore, the sculptor, go further still and remain the deepest expression of what humanity went through. Other painters, who should be mentioned are Matthew Smith, whose Hogarthian directness of handling goes with a S. Fr. warmth of colour, and Mark Gertler, a Jewish artist, whose still-lives and portraits are excellently composed and beautifully painted. Of recent tendencies the most vigorous connect with Wyndham Lewis or Piper and Sutherland and the Brit. Romantic painters. The water-colour drawing from that quarter seems in a particularly lively, enterprising state—others again travel with the Euston Road group on their way from Camden Town. The state of the artist is more precarious than even before, on account of the violent changes in the social system. Patronage in the old style is dead and the only prospect for the artist is to become a week-end painter. The crisis is now and the outlook gloomy, in spite of the excellent intentions of such bodies as the Arts Council. In Russia the painter is paid by the state, which claims his work when finished. His livelihood is thus assured, but he has to submit to a rigid direction from the state in relation to subject matter and style. Soviet P. shows the influence of European P., but at a level of

undistinguished naturalism. In France, as indeed in Europe, it is still Picasso, Matisse, and Braque who dominate the scene. *See also* DUTCH ART; ENGLISH ART; PAINTING; FLEMISH ART; FRENCH ART; GERMAN ART; IMPRESSIONISM; ITALIAN ART; LANDSCAPE; PORTRAITURE; POST-IMPRESSIONISM; SEASCAPE; SPANISH ART; STILL LIFE; and articles on art under countries.

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Painting and Decorating. Painting is the covering of a surface with paint in order to prevent its deterioration by exposure to the air. Decorating is artistic, as well as utilitarian, in its aim. The term covers paperhanging, decorative painting, and the use of decorative paints and coloured washes on ceilings and walls. Both painting and decorating are frequently done by the amateur as well as the professional.

Exterior Painting.—Various types of brushes are used, differing according to the article painted. For painting door panels, gates, etc., brushes at least 2 in. wide are normally used and brushes 1½ and 1 in. respectively for painting window sashes and smaller surfaces. The latter are sometimes called sash tools. Only brushes of high quality produce a perfect finish. It is necessary to clean the brushes after use thoroughly in turpentine and soapy water. The surface to which the paint is applied, whether it is iron or wood, should be clean and dry. Dirt and moisture cause harmful chemical action, and moisture can produce blisters on the paint film. If in bad condition the old paint must be stripped with a blowlamp and scraper, holes and splits filled in with putty or one of the many special fillings such as alabastine, and the surface (if wood) sandpapered. If the old paint is not much blistered the surface should be

cleaned down with a solution of sugar soap and water, followed by a wash with clean water, and sandpapering follows, if necessary. Before painting ironwork all rust and scale is removed with a wire brush. Three coats of paint are generally used, priming, under coat, and top coat. The priming covers flaws and irregularities in the original surface, and provides a secure foundation for the subsequent coats. A red lead paint is used as a primer on wood and iron. Special primers are used for plaster surfaces. The under coat provides both good adhesion to the primer and a foundation for the top coat. As paint films change considerably in volume during drying and weathering, and also contract and expand with changes in temperature and atmosphere, it is necessary to choose paints which do not differ greatly in constitution from the paint of the following coat. An ordinary oil paint can be used as a top coat with a coat of good outside varnish as a protective, or with a varnish paint, known as 'hard gloss.'

Interior Painting.—It is not generally necessary to burn off the old paint. Grease marks may be removed with a weak solution of sugar soap, which is then washed off with clean warm water, and rubbed down with a soft cloth. A very fine glasspaper gives a smooth surface. If the new paint is a similar shade to the old, only one coat of paint should be necessary; but if the old paintwork is of a dark colour and a cream or light finish is required an under coat must be applied.

Distempering Ceilings.—Brands of distemper are obtainable in powder or paste form which require only the addition of water. The decorator should be equipped with two buckets of water, a distemper brush, and a sponge before commencing to wash off the old distemper. The brush is then filled with water and applied to the ceiling. Approximately one square yard at a time is well soaked, and the water then sponged off, the second bucket of water being used to clean the brush and sponge. When all the distemper has been removed the cracks in the ceiling and frieze are cleaned out with a pointed knife and stopped up with plaster of Paris or similar filling. A coat of size is applied to prevent the plaster from absorbing the distemper, and the distemper or white-wash follows. In order to avoid brush marks the work is done as rapidly as possible so that the edges of one section do not dry before the next is commenced. It is usually best to begin the work at a point in the room furthest away from the light. For walls an oil-bound distemper is used. The skilful decorator can choose from a wide range of colours to find the shade which will harmonise best with the situation and purpose of the room. For rooms which have little sunlight cream, primrose, and light shades are generally most suitable. Pastel blues and greens are at their best in a room facing S. In choosing colours of paint or distemper the home decorator should consider the likes and dislikes of the members of the family. The reaction of

a person to colour and preference of colour should be noted and remembered.

Paper-hanging.—Various types of designed paper can be used. In choosing the paper the size and use of the room in question should be considered. Repetitive patterns in a bedroom are not generally thought restful, and for small rooms neat, unobtrusive patterns are usually preferred, since the size and brightness of a pattern make the room appear smaller. The overall patterns, or patternless papers, are now the most popular. It is advisable to strip off the old wallpaper entirely before fixing the new; to do this the old paper should be thoroughly soaked in water twice, and the paper then pulled away with a stripper. Cracks and holes in the walls are then filled in with plaster of Paris, alabastine, or Keen's cement. Perfectly straight edges to the paper are essential if it is to be butt-jointed. This produces a better finish than the lap-jointed paper. Paste can be purchased which only needs mixing with cold water to be ready for use, but a flour and starch paste is also good. It is wise to use a lining paper on a bad surface, the wallpaper being pasted over it. If the paper is to be hung edge to edge (butt-joint) the first piece of paper may be hung in any corner of the room; if lap-jointed the papering should be started at the furthest corner away from the door. The paper is placed on a boarded trestle table, 21 in. wide, for pasting. When this is done the paper is pasted to the wall by attaching the top right-hand corner against the picture-rail, raising or lowering the left hand to bring the paper plumb, and pressing the paper on the wall with a paper-hanger's brush, working from the top downwards. For attaching to ceilings the paper is folded over a roll which is lifted with one hand while the end is attached with another. Embossed materials such as Lincrusta are stiffer than paper, and can, if desired, be oil-painted.

Mass Production Methods in Painting.—Painting by a brush is in many cases too slow a process to be economical, and often does not give such satisfactory results. Flowing is used on large flat surfaces such as the sides of trucks. The top is painted so that the paint flows over the surface, draining into a trough from which it can be pumped up for use again. Dipping is satisfactory where the paint is fulfilling an essentially protective function, since it enables the paint to penetrate parts which the brush could not touch. It can only be applied to articles where the paint can run off uniformly. The articles are put on a travelling belt which takes them through a paint bath into a drying chamber. Spraying, where the paint is sprayed through a nozzle, is chiefly used in the case of cellulose lacquer, e.g. in painting motor cars.

Some Decorative Methods.—Staining and graining are common methods of decoration in paintwork. Staining is the imitation in paint of hard wood, such as mahogany; graining is the imitation of natural wood. Plastic and cellulose paints and enamels are also used in

decorative work. Satisfactory results require a high degree of skill.

See C. H. Eaton, *Painting and Decorating*, 1930; E. W. Hobbs, *Painting, Enamelling, Paper-hanging, and Distemping*, 1937; D. Miller, *Interior Decorating*, 1937; J. P. Parry, *Painting and Decorating*, 1938; J. Mason, *Painting and Decorating*, 1948; W. P. Matthew, *Home Decorating*, 1948; and A. E. Hurst, *Painting and Decorating*, 1949.

Paints are mixtures of oil and pigments used for decorative purposes or for the fine arts, and are made up of the base, the vehicle, the solvent, and the driers, the pigment being added to obtain any desired colour. The base usually employed for building work is white lead, which is mixed with pure linseed oil, but red lead and oxide of iron are also used, the former as a base for red P., the latter for covering iron work. The vehicle enables a thin coat of paint to be formed uniform in colour and consistency, and usually consists of linseed oil or poppy-seed oil, but nut oils are sometimes employed on account of their cheapness. Turpentine is used as a solvent, or 'thinner', to allow the paint to be spread in a thin, even coat, and when a flat, dull surface is desired turpentine alone is used with the base, and the oil is omitted. 'Driers' are substances used to hasten the process of oxidation or drying, those most commonly used being litharge, sugar of lead, patent driers, sulphate of zinc, and manganese dioxide. Pigments are preparations obtained from minerals, animals, or vegetables, which when mixed into paint give it colour, the most ordinary being white lead, zinc white, umbers, siennas, ochres, chromes, Venetian red, Indian red, lamp black, bone black, vegetable black, ultramarine, Prussian blue, vermilion, red lead, oxide of iron, lakes, and Vandyke brown. For artists' colours the pigment is made into a paste with oil, and then put through a mill furnished with granite rollers, after which it is squeezed into tubos.

Paisiello, Giovanni (1741-1816), It. composer, b. at Taranto, learnt his art from Durante, Cotumacci, and Abos. After his first successes, two comic operas entitled *La Pupilla* and *Il Mondo a Rovescio*, fortune smiled on him in spite of the formidable rivalry of Piccini and Cimarosa, a rivalry which aroused endless jealousies in P. For eight years (1776-1784) he enjoyed the lavish patronage of the Empress Catherine at St. Petersburg, and he afterwards served Napoleon in Paris as musical director in his chapel. His *Barbiere di Singsla* seems archaic, mannered, and monotonous compared with Rossini's brilliant opera of the same name.

Paisley (in Rom. times *Vandura*), tn. on both sides of the White Cart, 3 m. above its confluence with the Clyde, and 7 m. W.S.W. of Glasgow, in Renfrewshire, Scotland. In the early eighteenth century the tn. was already noted for its manuf. of shawls (since gone out of fashion), silk-gauze, muslin, and linen; but the staple industry of to-day is the making of linen thread. Other industries

include dyeing, bleaching, distilling, engineering, ship-building, and the manuf. of chemicals, carpets, etc. There is a good harbour. In the tn. are statues to Robert Tannahill, the native poet; Robert Burns; Alexander Wilson, the Amer. ornithologist; Sir Peter Coats (d. 1890), who presented the free library and museum; Thomas Coats (d. 1883), who gave the observatory and Fountain Gardens; and George Aitken Clarke (d. 1873), the thread manufacturer, who helped to build the tn. hall. A fifteenth-century decorated nave is almost all that is left of the old abbey church, which was founded in 1163 by Walter Fitzalan as a Cluniac monastery. In 1307 the Eng. razed the abbey to the ground, and it had not long been rebuilt when it suffered terribly during the Reformation. St. James's Park, with its racecourse (40 ac.), and Brodie Park are the two largest open spaces. There is a sixteenth-century grammar school and a technical school. It sends one member to Parliament. Pop. 50,900.

Paisley Terrier, see **CLYDESDALE**.

Paita (Payta), port of N. Peru, in the dept. of Piura at the mouth of the Chira R. It is the outlet for the chief cotton dists. The tn. has an old-world Sp. appearance and the buildings are mostly of wood. Its anct. church has a miraculous statue of the Madonna. It exports, besides cotton, hides and skins, and Panama hats from Catacaos. Pop. 7000.

Paivarinta, Pietari (1827-1913), Finnish novelist, b. at Ylivieska, was the son of a peasant, and made his name as a writer with stories of peasant life. He was one of the first to write fiction in Finnish, his publs. including *Tintti Jaakko* (1883); *Syyt lehtiä* (1900); and *Pikku kuvia elämästä* (1904).

Pajou, Augustin (1730-1809), Fr. sculptor, b. in Paris, won the Prix de Rome in 1748, and thus was sent at public expense to Rome to study art. On exhibiting his 'Pluto holding Cerberus in Chains', he was elected to the Academy. He carved excellent portraits of Mme du Barry, Bossuet, Buffon, Turenne, Pascal, and Descartes, and executed also the sculptures of the Salle de l'Opéra at Versailles. His 'Psycho Forsaken' is now in the Luxembourg.

Pakhoi, seaport, 12 m. S.E. of Lien-shoufu in Kwangtung prov., China. The native and foreign quarters are distinct, the latter being on a hill. Since 1876, when it was opened for international trade, the volume of its exports (indigo, aniseed, cuttle-fish, sugar, and cassia-oil) has grown enormously. Manganese ore is mined near by. Pop. 35,000.

Pakistan, Muslim state in the N.W. of the Indian sub-continent, including also a part of Bengal, and constituting a dominion of the Brit. Commonwealth of Nations, which was formed on the partition of India under the Independence of India Act, 1947 (the name India being appropriated to the Hindu state or dominion). P. is the largest Muslim state in the world, the total area being 361,007 sq. m. and the pop. 70,103,000, of which

72.7 per cent are Muslims. It includes the provs. of Sind (48,136 sq. m., pop. in 1941, 4,535,008), W. Punjab (62,100 sq. m.; estimated pop. in 1917, 10,870,900), E. Bengal, inclusive of Sylhet (54,100 sq. m.; estimated pop. in 1947, 44,081,381), the N.W. Frontier Prov. (14,363 sq. m.; pop. in 1941, 3,038,067), Baluchistan (134,002 sq. m.; pop. in 1941, 857,835), and sev. states, including Bahawalpur (17,494 sq. m.; pop. in 1941, 1,341,209) and Khairpur (6050 sq. m.; pop. in 1941 305,787). In the Punjab the Boundary Commission of 1947 assigned Lahore city to P., while Amritsar, the holy city of the Sikhs, remained in India. The prov. of W. Punjab, including the whole of the Rawalpindi and Multan divs. and the dists. of Gujranwala, Sheikhupura, and Sialkot from the Lahore div., was also given to P. (the prov. of E. Punjab was assigned to India). The Gurdaspur and Lahore dists. of the Lahore div. were divided between the two dominions. In Bengal P. received the whole of the Chittagong and Dacca div. and most of the Sylhet div. of Assam (Calcutta went to India). In the Punjab the debatable ground proved to lie in and around the area between the Beas and Sutlej Rs., on the one hand, and the R. Ravi on the other. The fixing of the boundary here was also complicated by the existence of canal systems vital to the life of the Punjab, but developed only under the conception of a single administration, and of systems of road and rail communications which had been planned in the same way. There was also the stubborn geographical fact of the respective situations of Lahore and Amritsar, the claims to each or both of these cities being vigorously maintained by both states. During the assignment of boundaries in 1947 there were terrible communal massacres in the Punjab. Marauding gangs of Sikhs, who regarded the Punjab as their own country exclusively, burned innumerable Muslim vils. in E. Punjab and butchered thousands of Muslim villagers, while the Muslims retaliated by butchering Hindu and Sikh inhab. in W. Punjab. It is estimated that 3,800,000 non-Muslims crossed into E. Punjab and that only 100,000 remained in P., 50,000 of whom were in the N.W. Frontier Prov., while between 1,000,000 and 2,000,000 Muslims trekked into W. Punjab as a consequence of these communal massacres. By early 1948 more than 5,100,000 refugees had been settled in the sixteen dists. of W. Punjab, in place of 3,585,000 who had emigrated to India.

Prior to the formation of the new state of P., the word 'Pakistan' denoted the national movement among Indian Muslims for a separate independent state from that of the Hindus in the ultimate constitutional settlement. The word itself has often been stated to be a sort of anagram suggested by the word *Pak*, 'pure' or 'clean,' connoting all that is noble and sacred in Muslim life, but composed of letters taken from the component Muslim provs., Punjab, Afghanistan (com-

monly known as the N.W. Frontier Prov.), Kashmir, Sind, and Baluchistan. However that may be, the name was given (according to the *Encyclopædia of Islam*) to these ters. by C. Rahmat Ali, founder of the P. National Movement, in 1933, 'with a view to preserving their historical, national, and political entity as distinct from Hindustan proper.' But these do not represent the territorial limits of what was implied in P., or at any rate in the P. National Movement. There was a second part of the programme to which Mr. Jinnah, the Muslim leader (later governor-general of P.), did not subscribe, namely that Bang-i-Islam (i.e. Bengal and Assam) and Umanistan (the Hyderabad section of the Deccan) should be added to the ultimate Muslim state. The P. National Movement was strongly opposed to the Indian Federation and, owing to the numerical superiority of the Hindus (the proportion is four Hindus to one Muslim in the total pop.), it resisted amalgamation with Hindustan, which it regarded as fatal to the future of the Muslims as an independent nation in the predominantly Muslim ters. of P. It contended that only the acceptance by Hindustan and by Great Britain of the demand of P. for the recognition of her right to her own national gov. could lead to a settlement of the age-old Hindu-Muslim conflict. It is claimed that for the first time since the fall of the Mughal Empire in India, the P. National Movement re-awakened the Muslims in India to a sense of their national future, and its religious and patriotic character did no doubt strongly attract the younger generation to its ideals. The demand for P. seems to have been first officially adopted by the Muslim League at Lahore, in March 1940. The appeal which the P. plan made to Muslims, however, had been steadily growing since the Government of India Act, 1935, though actually the conception of two Indias is much older. As long ago as 1888 Sir Syed Ahmed Khan regarded Muslims as constituting a separate nation from the Hindus. Brit. policy, however, favoured the idea of a united India and it was only since the difficulties of securing agreement on the Indian Constitution were fully understood that the Brit. Gov. began to admit the possibility of P. The Brit. Gov.'s draft declaration of March 1942 (the Cripps proposals), which proved to be unacceptable to the Indian leaders, admitted the right of any prov. not prepared to accept the prospective constitution to retain its existing constitutional position and this was recognised as permitting a form of P., though the Muslims complained that the right of non-accession applied only to the existing provs. which had been formed from time to time for administrative convenience and on no logical basis. The draft declaration of Sir Stafford Cripps, however, gave no guarantee of P., but merely kept open the issue of P. See also INDIA.

Much of the area of P. is desert and mt. It has no heavy industries. It is an agric. country, but vast regions have been

lost through erosion. An undeveloped land divided in two was expected on the advent of partition, but not a truncated state, with frontiers drawn up by political compromise, following no obvious natural barriers. At present the two segments, the larger in the N.W. and the smaller, E. Bengal, are linked only by wireless, but for most purposes communication is dependent upon the goodwill of the other dominion.

Physical Features.—The N.W. Frontier Prov. is very mountainous, ranging from the thickly vegetated mts. in the N., which rise to 20,000 ft., to the somewhat arid hills in the S., rising to 11,000 ft. Baluchistan is, in the main, a mass of barren hills rising in some places to 10,000 ft. The Punjab is a plain irrigated by the five rivs. of the Indus (q.v.). In Sind there are considerable stretches of arable lands lightly covered with sand. Apart from the Baluchi hills along its W. frontier Sind is flat. The R. Indus, 1700 m. long, flows right through W. P. and enters the Arabian Sea, S. of Karachi. Pakistani Assam and E. Bengal are, generally, rather flat, with a mt. range running from N. to S. near the W. Bengali border. The Brahmaputra, a riv. as long though not as important commercially as the Indus, flows through E. Bengal to the bay of Bengal. The spread of civilisation has resulted in a steady decline in the number of wild animals in P., but a few are still found. The tiger, often 8 ft. in length and weighing 25 stone, is at its best in E. Bengal and Assam, where the smaller leopards are fairly common. The nilgai, a large deer, is also found in E. Bengal. In the N. mts. of W. P. are found the Himalayan black bear, about 4½ ft. long, the Himalayan brown bear, rather larger than the black, the stag, and the ibex (for fauna and flora generally see under INDIA.)

The chief cities with their pop. (census of 1941) are Lahore (671,700), Karachi (cap., 359,400), Dacca (213,200), Rawalpindi (181,200), Multan (112,800), Sialkot (138,300), Peshawar (130,900), Hyderabad (102,000), Dera Ismail Khan (60,500), Chittagong (40,000), Quetta (38,500, excluding cantonment), Kohat (28,500), Bahawalpur (18,500), Kalat (15,000), Khairpur (about 15,000).

Production.—P. has enough oil for its own needs, and some coal, chromium, iron, copper, and other metals hitherto little exploited on account of transport difficulties. Its distinctive wealth lies in jute and cotton. The acreage under jute was returned (1948) at over 1,800,000 in E. Bengal and Sylhet. Some 1,170,000 bales of cotton were produced in P. in 1945-46, mainly grown in the Indus basin (as against 1,260,000 in the much larger dominion of India and 1,010,000 in the states). Some of the best varieties of cotton, 'Sind American' and 'Punjab American', with inch-long staples, are grown in P. But the bulk of all the jute and cotton mills are in the dominion of India, which will need to import, for some time to come, about 1,000,000 bales a year from P. P. produces about a third of the whole

Indian yield of rice and this may well increase in Sind, owing to the Lloyd Barrage, which brought 6,000,000 ac. under cultivation, independent of rainfall. P. accounts for about 40 per cent of the total production of wheat in what was Brit. India. E. Bengal produces over 4,000,000 lb. of tea a year, and the dominion as a whole can export 30,000,000 tons (as compared with 400,000,000 from India). It is evident that the produce of P. is essential to the economy of the other dominion's factories owing to the danger of famine and the great pop. But on the other hand P.'s weakness lies in its meagre industries, for only 25,000 people are employed in factories as against 1,000,000 in India. But one compensation for the



High Commissioner for Pakistan

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absence of an industrial pop. is that P. is far less susceptible to Communist penetration than is India; further there are much less marked contrasts in social classes in P., a high proportion of the W. Punjabis being peasant proprietors.

Races.—Three distinct groups of peoples are found in P., two in W. and one in E. P. The true Punjabi is an Indo-Aryan, a descendant of the Aet. Aryan invaders of India. His height is about 5 ft. 8 in., complexion light brown, face hairy and nose prominent but narrow, and head much longer than broad. The occupations of these people are very varied, but most of them are agriculturists. Their numbers include Hindus and Sikhs. The people of the N.W. Frontier Prov. and Baluchistan are of Euro-Asiatic descent. They are tall and well built, with very light brown complexions, and the great majority are Muslims. They are credited with a keen sense of humour and much sincerity. The women generally are well favoured despite the custom of *purdah*. The third type, found in Bengal,

is the Mongolo-Dravidian, the result of the ant. Mongolian invaders meeting the Dravidian aborigines of the Indian peninsula; they are usually known as Bengal Brahmins (Hindus) and E. Bengali (Muslims). They have dark complexions, hairy faces, broad heads and noses, and average 5 ft. 7 in. in height. They are excellent at all kinds of clerical work. The masses in P., as in the dominion of India, are on the whole simple, illiterate, and gullible. Many of their political leaders, however, are highly educated and familiar with W. civilisation.

Languages.—It has been decreed that Eng. shall be an official language of P., although only 1 per cent of the pop. is literate in this tongue. Urdu (also an official language), which is based on Persian and Arabic, is generally understood in W. P., and Hindi in E. P. Sindhi is the natural language of Sind, Baluchi and Brahui of Baluchistan, Pushtu of the Frontier, and Punjabi of the Punjab, apart from the lesser languages. The script is in Persi-Arabic characters in all cases except Hindi, Gurmukhi, and Karachohli which are written in Hindi characters (from Sanskrit); Urdu, Punjabi, and Sindhi may be written in Hindi script; Jaki has a script of its own; the language of 7,000,000 peoples, it is often known as Lahnda or W. Punjabi. The main language of E. P. is Bengali, a lesser tongue being Assami; both are written in Hindi script (see also INDO-EUROPEAN LANGUAGES).

Art and Science.—None of the classic Indian works of sculpture is Mussulman, and although the Mughals produced fine paintings, these are mostly now in the dominion of India. Science has up to now played a very small part in the lives of the people, though there is a branch of the Indian Chemical Society at Lahore. The only univ. in P. is the Punjab Univ. at Lahore, which awards degrees in art, science, teaching, engineering, law, medicine, commerce, agriculture, and oriental studies.

Constitution.—The resolution for the framing of a constitution for P. was moved in the constituent assembly on March 7, 1949. The resolution seeks to ensure democracy, freedom, equality, tolerance, and social justice as enunciated by Islam, and it promises adequate provisions for minorities freely to express and practise their religions and develop their cultures. It also provides that P. shall be a federation whose independence and sovereign rights on land, sea, and air shall be safeguarded. The independence of the judiciary is assured in a special clause. The work of the constituent assembly in framing the constitution was not completed by 1949 and the assembly had still to evolve the best method for the distribution of powers at the centre and the federation of the units, and how the units should be defined. The provs. of Sind, E. Bengal, and the N.W. Frontier Prov. had provincial govts. functioning under the Government of India Act, 1935. In 1949 there was no gov. in W. Punjab and that prov. was ruled under section 93 of the

Government of India Act (which provides for rule by a governor in the absence of a cabinet), the governor being assisted by five advisers. Baluchistan is centrally administered, as also are sev. states, including Bahawalpur, Khairpur, Kalat, and Kharan.

History since August 1947.—The supporters of Mr. Jinnah adopted a pop. divided in language, culture, social habits, and degrees of development, and prov. groups more nearly akin to their neighbours in adjacent areas of the Indian Union than to their now compatriots in other parts of the dominion of P. It was vaguely believed that the 'Land of the Pure' would at least be uncontaminated by Hinduism, but, as stated above, there are in P. many millions of Hindus, and only the Sikhs have gone. Although for many years P. will be dependent on the co-operation of the Brit. Commonwealth and on the efforts and loyalty of its Brit. civil servants and service commanders, the knowledge that the fate of their new-born country ultimately depends on their own efforts is shared by most people in P. The 2nd Battalion, the Black Watch, the last Brit. army unit to leave P., sailed from Karachi on Feb. 26, 1948.

After the Brit. Gov. had accepted the principle of partition and the new dominions of India and P. were created (Aug. 15, 1947), large areas of the Punjab (as noted above) became a battleground between fanatical Muslims, Sikhs, and Hindus. Thousands of people were slaughtered or burnt alive in the flaming ruins of their vils. and soon vast numbers of panic-stricken fugitives were pouring E. and W. over the dividing line of the bisected Punjab, harried on their way by hostile bands. Delhi itself became a battlefield (Sept. 1947), and in Calcutta a communal hatred exacted its toll despite the devoted efforts of Gandhi and his followers. Faced by a common peril the new govts. of I. and India were compelled to co-operate for the time being and in two months the outrages became more or less sporadic and gradually died down. By early 1948 law and order were maintained except in a few areas troubled by tribesmen. Unlike E. Punjab, law in W. Punjab was being enforced by the police and not by the military. Everywhere there was evidence of a fairly smooth functioning administration, despite the fact that when the state was first constituted Mr. Jinnah's supporters, who had only dimly grasped the significance of his idea of P. when trans. into land, people, natural resources, and industrial potential, were in most instances appalled by the task which confronted them. The country's strongest asset was perhaps the exacerbated nationalism produced by suspicion of Indian policy.

With the passing of the immediate threat of common disaster relations between the two govts. deteriorated, though it was found possible at the Lahore conference in Dec. 1947 to reach agreement on the div. between the two dominions of the financial assets and liabilities of the former gov. of India, as well as upon questions

of military supply. The problem of the accession of independent states, however, proved especially intractable in Kashmir and Hyderabad. In Kashmir, a predominantly Muslim state with a Hindu maharajah and a well-to-do class largely of the Islamic faith, Muslims rose in revolt. They were supported by large numbers of tribesmen from across the border, to whom P. was accused of giving aid. The maharajah thereupon applied for accession to India. Delhi accepted this as a *modus vivendi* and hurriedly sent troops to save the state cap. and disperse the insurgents. This move provoked violent repercussions in P., which was naturally sympathetic to fellow Muslims. The P. Gov. refused to recognise the 'accession' and its Prime Minister, Liaquat Ali Khan (q.v.), accused Delhi of having plotted the whole affair *ab initio*. The year 1947 ended with the reference of the Kashmir dispute by the Indian Gov. to the Security Council of the United Nations (see further under KASHMIR). At one time Afghan support for the Pathanistan project (a separate state for the Pathan tribesmen of the N.W. Frontier) threatened to cause bad blood, but fortunately, this policy changed and cordial feeling was established between the two countries (see also under NORTH-WEST FRONTIER).

In looking back on the first year of Pakistan independence, with its interlocked problems of building a completely new governmental machine and the threatened chaos produced by the influx of ten million refugees, the country could derive confidence from what had been achieved by human endeavour and a deep-rooted spiritual consciousness of the essential rightness of the task it had set itself. A period of political instability followed the death of Jinnah, but it was allayed by the swift appointment of Khawaja Nazimuddin (q.v.), premier of E. Bengal, as governor-general, and by the energy of Liaquat Ali Khan (q.v.), for long the devoted lieutenant of the late governor-general. The political hist. of the provs. in 1948-49, with the exception of E. Bengal, was not encouraging, especially in Sind, which is noted for instability and faction. The proposal to form the ter. of W. P. and Baluchistan into one legislative body seemed likely to meet with determined opposition in Sind. With respect to this political friction, however, it is to be borne in mind that there was as yet in P. no opposition, in the ideological sense, to the existing regime, and political strife was usually a matter of personal faction and feud. It was averred by critics of the Muslim League that ever since independence was won, the executives of this all-powerful League had lost touch with the people and been preoccupied with their own political and personal fortunes. Whereas in India there was already an active opposition outside Congress, in P. it was unlikely that for many years an effective opposition could emerge otherwise than from the ranks of the League itself. Leaving aside political disturbances and activities abroad and at home, achievement in the first year

belonged to the designers and planners. Broad targets were set for agriculture, industries, motive power, health, and labour, and a co-ordinating master-plan for the whole of the country was prepared and, in 1950, a start was to be made in implementing the various schemes.

See Ikkal Ali Shah, *Pakistan: a Plan for India*, 1944; Pakistan Institute of International Affairs (pub.), *Introduction to Pakistan*, 1948; E. Taylor, *Richer by Asia*, 1948; T. G. Spear, *India, Pakistan, and the West*, 1949; and Sir G. Hearn (ed.), *Murray's Handbook to India, Pakistan, and Ceylon*, 1949.

Pakokku, dist., with an area of 6210 sq. m., in Upper Burma. Arid regions are interspersed between the fertile valleys of the Yaw, Myittha, and Mön-Sesamum. Oil is found at Yerangyat. Millet and sugar, and also maize, vegetables, rice, and tobacco are cultivated. The tn. of P. (30,000 inhab.), situated on the Irrawaddy, is a lumbering centre. Pop. 560,000.

Palace (Lat. *palatium*, from Mons Palatinus), word adopted in varying forms (*palais*, *palast*, *palazzo*, *palatium*, O.E. *palent*) by all European languages. Properly applied to imperial and royal residences, as to those of an emperor, a king, or pope, it is also used by extension for any sumptuous habitation. Any episcopal residence receives this name in England, as Fulham, Lambeth, and Cuddesdon palaces. Windsor Castle is the finest example of an Eng. P. in the original sense. The derived meaning of a spacious and attractive building is familiar in the modern 'picture P.' and other places of entertainment.

Palace Court (*Curia Palatii*), court erected by the highly unconstitutional Charles I. in 1631 to try personal actions arising within 12 m. of Whitehall Palace, whether either of the litigants was of the royal household or not. The judges were the steward of the king's household and the knight-marshal; but later it was presided over by a barrister-deputy, and held weekly in Scotland Yard. Together with the other exceptional and prerogative courts, the Court of Marshalsea and the Court for the Honour of Peveril, it was abolished in 1849, the pending causes being transferred to the common pleas (q.v.) or the co. courts, and the records handed over to the custody of the master of the rolls.

Palace Theatre, in Cambridge Circus, London, opened Jan. 31, 1891, as the Royal English Opera House under the management of Richard d'Oyly Carte, with Sullivan's *Ivanhoe*, which ran for 155 performances. The P. T. has always been noted for musical comedy, and among its successes have been *No, No, Nanette*, *Dinner at Eight*, *Anything Goes*, *Jack and Jill*, and *Under 100 Hat*. The theatre was damaged by bombs in the Second World War, but was reopened afterwards.

Paladin, name given to the twelve peers of Charlemagne, such as Roland, and also to knights-errant generally. The exploits of the P's form the theme of the French or national epic known as *Chansons de Geste*, the matter of which tended to

centralize about one person, Charlemagne, the champion of Christianity and chivalry against the hated Saracens. The word *P.* is derived from Lat. *palatinus*, and literally denotes a courtier, member of a royal household, or a person connected with a palace. The *palatium* of the Rom. emperors on the Palatine Hill supplied a name for any imperial residence of medieval Europe, and a corresponding adjective and noun for royal officials and dependants.

Palaeobotany (Gk. *παλαιός*, anct.), the branch of botany concerned with the flora of bygone ages. Knowledge of these flora is gained by examination of fossils, i.e. plants or their parts which were embedded and remained undisturbed in mud, sand, or ooze while the sediments hardened into rocks. Other fossil specimens were preserved by encrustation or by infiltration with silica or with salts of calcium. In many cases, although the parts of the plant have decayed, they were in such intimate contact with a plastic medium that as putrefaction occurred, very clear and detailed impressions of the plants were formed. Casts of hollow stems, bulky seeds, and of leaves yield considerable information with regard to the morphology of the plant. Some plant remains are found in amber and other fossilised secretions. The earliest plant fossils hitherto discovered were those of Proterozoic simple algae, resembling modern blue-green algae (Cyanophyceae), and of bacteria. These were 'iron' bacteria taking iron salts from the water, and forming extensive deposits of iron. In the Palaeozoic era, from the beginning of the Cambrian to the end of the Silurian periods, the only plant fossils are those of marine algae, possibly of the blue-green, green (Chlorophyceae), and red (Rhodophyceae) groups. In the Lower Devonian strata are found the earliest fossils, e.g. *Pellaphyton*, *Rhynia*, *Asteroxylon*, recognised with certainty as land plants, but these show such marked differences from fossils of earlier aquatic plants that it seems probable that there were intermediate forms hitherto undiscovered, perhaps because conditions may not have favoured preservation, or the rocks including such plants may now be inaccessible. The plants of the Upper Devonian strata were much better developed, and included seed-bearing trees from 30 to 40 ft. high. In these strata many of the plants subsequently so prolific in the Carboniferous period made their first appearance. The ancestors of modern Horsetails and Lycopods were well-developed trees during this period; ferns were abundant, and fern-like seed-bearing plants, the Pteridosperms. The abundance of vegetation at this time may be judged from the coal formed by slow decomposition of these plants under the enormous pressure of subsequent strata. In the early and middle periods of the Mesozoic era, cycads and conifers, ancestors of modern representatives of these groups, became predominant, and towards its close primitive flowering plants appeared. Some early flowering plants, the

Caytoniales, have been found fossilised at Cayton Bay (Yorkshire) by Dr. H. Thomas. These became increasingly abundant from the Tertiary to the Quaternary periods of the recent or Cainozoic era, and included many forms similar to those of living flowering plants. *P.* is essential to the study of relationships and the evolutionary development of plants (see *ZOOLOGY*). See D. H. Scott, *Studies in Fossil Botany*, 1920, and *Extinct Plants and Problems of Evolution*, 1924; F. H. Knowlton, *Plants of the Past*, 1927; R. Crookall, *Coal Measure Plants*, 1929; and A. C. Seward, *Plant Life through the Ages*, 1931.

Palaeogeography, study of climatic conditions, and of land and sea areas, in geological times. See *PALAEONTOLOGY*.

Palaeography (Gk. *παλαιός*, anct.; *γραφειν*, to write) is the branch of knowledge which seeks to decipher (that is, to read and interpret), to date, and place any kind of anct. writings. In the widest sense of the word it deals with all anct. written documents or engraved monuments in any language, on any writing material, from any period. There are, however, certain branches of study which treat of particular kinds of written documents, such as numismatics (*q.v.*), which deals with inscriptions on coins; sphragistics, which treats of writings on seals; and epigraphy, which deals mainly with anct. inscriptions cut, engraved, or moulded on hard material, such as stone, metal, or clay. Thus *P.* in the narrow sense of the word deals mainly with the softer materials on which handwriting, as distinguished from monumental engraving, has been inscribed; that is, with writing that is painted or traced in ink or colour, with a stylus, brush, reed, or pen, on such materials as papyrus, parchment, papyrus, linen, or wax. Still, there are certain exceptions, and sometimes *P.* has to inquire into the employment of metals, clay, potsherds, wood, and other writing materials. The line between *P.* and epigraphy is therefore not absolute. Typical examples of the border line are *ostraca* (documents written in ink on potsherds after the vases have been broken) and *graffiti* (wall-scribbles, discovered in large numbers at Pompeii).

On the other hand, the distinction between *P.* and epigraphy is less superficial than it may appear. The forms of written letters, similar at first to the engraved letters of the inscriptions, developed more swiftly, and with few exceptions the difference is maintained in all scripts. Writing materials have always played a great part in the external development of the single letters. Other causes are as follows: (1) The necessity of speed in writing, assisted by innate laziness, produces the various cursive scripts. Under the pen of the expert scribe, who sought to save time, the letters naturally assumed less exact shapes, as strokes were slurred, superfluous were dropped out, angles were curved; letters were linked together, these forms becoming similar to each other (so that it is hard to distinguish them); abbreviations were employed. (2) This tendency is counter-

acted by the reader's demand for clearness. In anct. times writing not only served as an instrument of private communication, but it was also applied to the purposes of literature. No author would allow his writings to be pub. in a form which could not be perused with ease; thus neatly written books were essential, and with the necessity for multiplying literary works, the creation of a formal kind of writing suitable for books intended for the market was the natural result.

(3) *Æsthetic reasons*: the study of the development of writing as dependent on æsthetic reasons is the subject of calligraphy. In some countries the profession of calligraphist was held in high esteem; indeed Chinese, Arabic, and Indian calligraphy have reached very high levels. According to some scholars, the importance of calligraphy in Christian MSS. was impaired by the development of the art of miniature. However, the desire for the writing to look beautiful on the whole makes for clearness, though in some cases it produced excessive uniformity, the scribe as it were forcing all the letters into one mould so that they should not spoil the regularity of his line or page. Naturally these various motives and inducements differed in relative strength with the purpose of the written document.

Hence the student of P., in its numerous branches (Indian, Gk., Lat., Heb., Arabic, etc.), generally distinguishes two classes of handwriting, the ordinary cursive script, or current hand, common to all and employed for everyday-life purposes, and the carefully written literary or book-hand, in which works of literature were usually written. The two classes, however, cannot always be kept absolutely distinct. Between them there might be a whole series of varieties which have some of the peculiarities of each group. For instance, a kind of book-hand might be employed by a trained scribe, often for some official reason, in drawing up a document which more usually would be inscribed in cursive characters; or cursive writing might be employed by a scribe copying books for private study.

In P. large letters are called *majuscule*, small letters *minuscule*. A variety of the capitals or majuscule of the Gk. and Lat. monumental scripts is known as *uncials*, which are a modification of the monumental letters, in which curves are freely introduced as being more readily inscribed with the pen on soft material. Uncials are the ordinary characters used in early Gk. papyri and vellum MSS., as well as the most anct. extant forms of the Lat. book-hand. It was doubtless the character best adapted for calligraphy. The semi-uncial script, i.e. the mixed hands of uncials and minuscule letters, which was the main book-hand from the fifth to the ninth century A.D., was easier than the uncials and more calligraphic than the cursive minuscule. The Gk. and Lat. minuscule are derived from the majuscule. Although they already appear in the last centuries B.C., a full minuscule alphabet was only slowly developed. Out of the Rom. cursive minuscule,

various national minuscule arose (It. or Lombardic; Merovingian in France; Visigothic in Spain; Germanic; and particularly the Insular or Anglo-Irish hands). From the period of Charlemagne to the close of the fifteenth century, the Caroline or Carolingian hand, to which is mainly due the blending of the majuscule and the minuscule, and later also the 'block-letter' were the more important hands. The fifteenth century witnessed the dissolution of the later 'national' hands of the Middle Ages. The neat humanistic or renaissance hand, then introduced in Florence and employed for literary productions, developed into the (1) Venetian minuscule known as *italics*, probably the most perfect form of letters and the most clearly legible which has yet been invented, and (2) the 'Rom.' type, perfected in N. Italy, chiefly at Venice. The monumental type of the Lat. alphabet, taken over for the majuscule, and both forms of the minuscule, the Rom. and the *italics*, spread all over the world. In England they were adopted, from Italy, in the sixteenth century.

The study of P., in all its branches, is of the greatest scientific and practical importance to anct. and mediæval hist., to classical philology, to textual criticism, and to other branches of historical science. A particular branch of P. termed *papyrology* (q.v.) deals with the decipherment and interpretation of writings on papyrus. See also LETTERING.

See F. M. Thompson, *Handbook of Greek and Latin Palæography*, 1894, and *The History of English Handwriting*, 1901; W. Keller, *Angelsächsische Palæographie*, 1906; D. Diringer, *The Alphabet* (2nd ed.), 1949; and A. Fairbank, *A Book of Scripts*, 1949; also bibliographies of ALPHABET; MANUSCRIPTS; WRITING; GREEK; HEBREW LANGUAGE; LATIN LANGUAGE, etc.

Palæolithio, see ARCHÆOLOGY; FLINT IMPLEMENTS; STONE AGE.

Palæologus, name of an illustrious Byzantine family, which first appears in hist. about the eleventh century. The family grew in power and importance until Michael P. became in 1260 emperor of Nicea, and in 1261 emperor of Byzantium as Michael VIII. He d. in 1282, but the dynasty thus started lasted for nearly two centuries. The line of the emperors is as follows after Michael VIII.: Andronicus II. (1282-1328); Andronicus III. (1328-1341); John V. (1341-76); Andronicus IV. (1376-79), who deposed John V. for that space of time; John V., who won the throne again from 1379 to 1391; Emanuel II. (1391-1423); John VIII. (1423-48), and Constantine XI. (1448-53), who fell in the siege of Constantinople by Mohammed II. The family also furnished rulers to sev. principalities, whilst a branch ruled in Montserrat from 1305 to 1533. Andrew P., supposed to be a descendant of Constantine XI., was a claimant for the Byzantine empire, but resigned in favour of Charles VIII. of France.

Palæontology, science of fossils, treats of the life which existed on the globe in the past. Fossils are classified in two

ways, geologically and biologically. Geologically they may be arranged in groups in the order in which they occur in the strata, i.e. a chronological scheme of classification. As biology is subdivided into botany and zoology, so P. is regarded as consisting of Palaeobotany (q.v.) and Palaeozoology. The former branch of P. deals with fossil plants, which have been arranged into two sub-kingdoms, viz. the Phanerogams, or flowering plants, and the Cryptogams, or non-flowering plants. Palaeozoology treats of extinct animals. These are arranged by zoologists into two divs., the Vertebrata (animals with a backbone) and the Invertebrata (without backbone). The former class constitute a single phylum, while the Invertebrata are divided into eight phyla, viz.: (1) Protozoa (animals of the earliest type, such as Foraminifera, Infusoria, etc.); (2) Porifera (comprising the sponges); (3) Coelenterata (including corals and zoophytes); (4) Echinodermata (sea-urchins, starfish, and encrinurus or sea-lilies); (5) Annelida and other kinds of worms; (6) Arthropoda (lobsters, insects, centipedes, and other jointed animals); (7) Molluscoidea (including bryozoa and brachiopods or lampshells); (8) Mollusca (lamellibranchs, gastropods, cephalopods, etc.). Each of these phyla is broken up into classes and still further into orders, families, genera, and species. The fossils obtained from the rocks are generally more or less fragmentary, but from these fragments it is possible to form an accurate conception of the entire organism. The principle of the correlation of parts, first applied by Cuvier, deals with the conservative hard parts, such as the teeth, etc., and constitutes a histological discovery. According to this principle all parts of an organism bear a fixed relation to each other, so that one part cannot vary without a corresponding variation taking place in the others. The principle has been so elaborated that from a single tooth or bone, shell fragments or stem, the paleontologist can at once form a fair conception of the complete organism. From the nature of the fossils the conditions of deposition of a geological formation can be surmised, the nature of the climates of past ages may be judged, and the physical configuration of the lands of past time drawn up (see FOSSILS). To the biologist the study of fossil animals is of importance, since not only are they the ancestors of modern species, but many groups now extinct (graptolites, trilobites, etc.) often throw light on the relationship of existing animals and plants. In some cases anct. forms serve to connect groups which at present appear to be quite distinct, e.g. the earliest known bird, archæopteryx (see BIRDS), shows affinities with reptiles (q.v.).

In spite of the imperfection of the record of life in past ages, the doctrine of evolution receives great support from P.'s testimony. Many groups of animals undergo gradual modification when traced through series of strata. The early forms of life gradually become more abundant, more specialised, and then die away again,

as in the group of Ammonoidea. Then in the Tertiary mammals we have a modification of structure. The Kocene forerunner of the horse possesses five toes, but in the Pliocene the existing type had one toe with splint bones, and other changes occurred, as in the character of the teeth. The recapitulation theory, which supposes that the changes in the development of the individual (ontogeny) are generally a rapid and incomplete repetition of those which occurred in its race-hist. (phylogeny), receives considerable support from the study of fossil species. In a review of the fossils which are found in the geological systems we find that there is a passage from the lower to the higher forms of life, each type becoming more and more specialised with the progress of time. Thus trilobites and lower forms of life occur in the Cambrian system, fishes appear in the Silurian, amphibians in the Carboniferous, reptiles in the Permian, and birds and mammals in the Jurassic. On the other hand some species, such as the brachiopod *Lingula*, have persisted almost unchanged from the Ordovician period up to the present day (see EVOLUTION; FOSSILS). The fossil hist. of man is dealt with under ANTHROPOLOGY and MAN. See H. A. Nicholson, *Manual of Palaeontology*, 1872; C. A. von Zittel, *Text-book of Palaeontology* (trans. C. R. Eastman), 1900-2, and *History of Geology and Palaeontology*, 1901; H. Woods, *Palaeontology: Invertebrata*, 1902, 1946; R. S. Lull, *Organic Evolution*, 1917; A. Morley Davies, *Introduction to Palaeontology*, 1920; H. L. Hawkins, *Invertebrate Palaeontology*, 1920; Enriqué Sparr, *Bibliografía de la Geología, Mineralogía y Paleontología*, 1920-22; E. Neaverson, *Stratigraphical Palaeontology*, 1928; A. S. Woodward, *Modern Progress*, 1932; and H. H. Swinerton, *Outlines of Palaeontology*, 1947.

Palaepolis, see EPIA.

Paleo-Siberian Languages, see under LINGUISTIC FAMILIES.

Palaetherium (Gk. παλαιος, anct.; θηρίον, wild beast), typical genus of the extinct family Palaetheriidae, which contained perissodactyle mammals related to horses and zebras. The species are found in the Upper Eocene of Europe. In general appearance they were tapir-like, but in size frequently attained that of a rhinoceros. The first species to be discovered was *P. magnus*, which was found in the gypsum of the Paris basin.

Palaozoic (Age of Anct. Life) includes the Cambrian, Ordovician, Silurian, Devonian, Carboniferous, and Permian geological systems. In the Lower P. the only fauna were invertebrates and fishes, whilst at the end of the age reptiles appear. The characteristic fossils of P. times are the trilobites (q.v.).

Palaephatus, name (which is perhaps a common pseudonym) of sev. anct. Gk. writers, four of whom are mentioned by Suidas (q.v.). The first was an epic poet, a native of Athens, who flourished before Homer. The second was a writer of Paros or Priene in the time of Artaxerxes Mnemon. The third was an historian of

Abydos, the contemporary and friend of Aristotle. The fourth was an Alexandrian grammarian according to Suidas, or a peripatetic philosopher according to Tzetzes. For the last named see J. Schrader, *Palæstræa*, 1893, and N. Festa, *Mythographæ præc.*, iii. 2, 1902.

Palæstra (Gk. *παλαίστρα*, a wrestling school, from *παλαίω*, I wrestle), name of a public place which in Grecian times was appropriated to exercises in wrestling and athletics generally. These were under official control, and were especially, though not exclusively, for the athletes training for the public and the Olympic games.

Palafox y Melzi, José de, Duke of Saragossa (1780-1817). Sp. patriot and soldier, descended from a distinguished Aragonese family. He accompanied Ferdinand VII. to Bayonne (1808), and on the latter's imprisonment headed the patriotic party in Aragon, and tried to prevent the Fr. invasion. His bold and courageous defence of Saragossa (1808-9) was one of the most brilliant exploits of modern hist., its fame rivaling that of the anct. siege of Numantia. P. was imprisoned by the Fr. at Vincennes till 1813, and then returned to Spain. See de Madrago's Sp. trans. of L. Thiers's *Histoire du consulat et de l'empire*, 1843, and O. Oman, *Peninsular War*, i., 1902.

Palagonite, isotropic glass, yellow, brown, or green in section, resulting from the alteration and hydration of basic glass or basalts. P. tuff is found among the products of the volcanoes of Sicily and Iceland, and has also been observed in the Carboniferous tufts of central Scotland.

Palae Language, see under INDO-EUROPEAN LANGUAGES.

Palamau, dist. in W. Bihar, India. It has an important coalfield, whilst tussore silk is the chief article of manuf. Area 4905 sq. m. Pop. (1941) 912,700.

Palamedes, Corunta, see HORNED SOREANRH.

Palamedes, one of the Gk. heroes in the Trojan war, son of Nauplius of Eubœa, his story belonging to the post-Homeric cycle of legends (see Stasius's *Cypria*). The usual account makes him deputed by the Gks. to induce Odysseus to join in the Trojan war. This he did by exposing the latter's feigned madness, thus incurring his enmity. He was falsely accused of treason by Odysseus, Agamemnon, and Diomedes, and stoned to death. See Philostratus, *Heroica*. 10: Euripides, *Orest.*, 422; *Frag.*, 581; Ovid, *Metam.* xiii. 56; and Jahn's monograph (1836).

Palamedes, or Palomides, Sir, one of King Arthur's knights, the knight 'that is yet unchristened, who has many a bout with Sir Tristram,' mentioned in Malory's *Morte d'Arthur* (books ix. and x.). See ed. of *Le Morte d'Arthur* in Everyman's Library, 1906.

Palamkotta, Palamcottah, or Palayamkottai, tn. of Madras, India, 5 m. E. by S. of Tinnevely. It is a Church of England missionary station and a road junction. Pop. 30,900.

Palanpur, or Pahanpur, cap. of the state of P. Bombay, India, 80 m. N. of Ahmedabad. Pop.: state 270,000; tn. 20,300.

Palanquin, type of litter used in the E., and carrying one person: the present form is a closed box, an earlier form being open. Poles are passed through rings, and the P. is carried by two or by four men.

Palas, see PELEW ISLANDS.

Palar, riv. of India, rises in Mysore and flows through the E. Ghats to the bay of Bengal, S. of Madras. Its water provides irrigation, and is supplied to the Kolar goldfields, the chief dam being at Arcot. Length 230 m.

Palate, roof of the mouth. It is composed of the *hard P.*, a bony structure covered with mucous membrane, and the *soft P.*, an aggregation of muscles covered with mucous membrane. The hard P. is formed by the palatine processes of the superior maxillary bones and the palatal bones. It has a slight ridge called the *palatine raphe* in the middle line which ends anteriorly in a little eminence called the *palatine papilla*; a number of ridges run transversely across the anterior portion of the P. The soft P. is composed of the muscles known as *tensor palati*, *azygus uvulae*, *palatoglossus*, and *palatopharyngeus*. A soft projection known as the *uvula* hangs downwards at the rear of the oral cavity. Behind the free edge of the soft P. is the pharyngeal isthmus communicating with the *naso-pharynx*. A ridge of mucous membrane runs from the soft P. to the edge of the tongue on each side, and is known as the *anterior palatine arch*. Another ridge forming the *posterior palatine arch* is situated about $\frac{1}{2}$ in. to the rear, and between the two ridges is an oval mass of lymphoid tissue called the *tonsil*. See also CLEFT PALATE.

Palatinate, The, former Ger. state of the S.W., originally belonged to the Palgraves of the line as an hereditary fief. In 1156 it was granted by the Emperor Frederick I. to his step-brother, Duke Conrad of Swabia, succeeded by Duke Henry of Brunswick. Frederick II. took away the P. from the latter in 1215 and gave it to Louis, duke of Bavaria, whose son Otto married Agnes, the daughter and heiress of Henry. Thus the P. came into the possession of the Bavarian family in whose hands it remained until 1559, when the line became extinct. Frederick III. of the Simmern dynasty, who associated himself with the Reformed Church, then became ruler of the P.; and Heidelberg, the cap. of the electors palatine, became a great centre of Calvinism. In 1648 the Lower P. was given to Charles Louis, the son of Frederick V., and a new or eighth electorate was created in his favour. During the War of the Sp. Succession John William, the elector of the Lower P., received the Upper P. also, but the latter was restored to the elector of Bavaria at the end of the war. On the death of the Elector Maximilian Joseph, the last of the Bavarian male line, in 1777, the two Ps. were reunited. In 1801 the portions of the Rhine P. on the l. b. of that riv. were taken by Franco Baden received Heidelberg, Mannheim, etc., and the rest fell to Hesse-Darmstadt, Nassau, etc. By the treaty of Paris of 1814 and 1815, the P. was again divided up, the greater portion

being granted to Bavaria and the rest to Prussia and Hesse-Darmstadt. Later the Lower P. (Ger. *Unterpfalz*) formed a dist. of Bavaria, with Speier as cap. The Upper P. (Ger. *Oberpfalz*) formed a dist. of Bavaria under the title of Upper P. and Ratisbon, with Ratisbon as cap. After 1945 the Lower P. formed part of the prov. called Rhineland P., with Koblenz as the cap. The Upper P. formed part of the prov. of Bavaria. Pop. (1939) 1,067,300.

Palatine (Lat. *palatium*, a palace). A count P. was, under the Merovingian kings of France, a high judicial officer. After the time of Charlemagne a similar title was given to any powerful feudal lord, to whom a prov. was made over with judicial powers, and the dist. so governed was called a palatinate or co. P. There were three co. P. in England (Lancaster, Chester, and Durham), which were made separate regalities on account of their respective proximity to the frontier of Wales and to that turbulent Northumbrian prov. which could not be accounted a portion of either England or Scotland. In virtue of their regal rights, the counts P. had their courts of law, and could pardon treasons, murders, and felonies. Lancaster seems to have been made a co. P. by Edward III. Henry VI. was hereditary duke and count P. of Lancaster, and on his attainder, the duchy and co. were forfeited to the Crown, and conferred on Edward IV., afterwards on Henry VII. and his heirs for ever. There is still a chancellor of the duchy and co. P. Chester is supposed to have become a co. P. when made over by William the Conqueror to Hugues d'Avranches. In the reign of Henry III. it was annexed to the Crown by letters patent, and since that time has been vested in the eldest son of the sovereign, or in the Crown. Durham seems to have first become a palatinate when William the Conqueror conferred upon Walcher the bishopric and dukedom of Durham. The palatinate jurisdiction continued united with the bishopric till 1836, when it was vested in William IV. and his successors. Pembroke was at one time a co. P., but ceased to be so in Henry VIII.'s reign. In very early times there were a number of similar privileges in Scotland.

Palatine Hill (*Mons Palatinus*), hill on which, according to tradition, Romulus founded the city of Rome (q.v.), the Capitoline Hill being occupied by Sabine. The P. H. is S.E. of the Capitoline and N.N.E. of the Aventine; traces of its fortifications are still visible. In later times it was the seat of the imperial residence, whence the Eng. words 'palace' and 'palatial.'

Palawan, or Paragua, one of the Philippine Is., to the W. of the group, between the China and Sulu Seas. The Is., which has a length of 240 m. and a breadth of 25 m., acts as a sort of breakwater, whence its name (meaning 'salute' in Buji language). The chief products are rattan, resin, and timber. It was developed as an air base by the Jap., who occupied it from May 1942 until March 1945. Area 4500 sq. m. Pop. 65,000; cap. Puerto Princess (pop. 5800).

Palaw Islands, see PELEW ISLANDS.

Palayam-Kottai, see PALAMKOTTA.

Palazzolo Acreide, tn. in the prov. of Syracuse, Sicily, 13 m. N.W. of Noto. It was founded by Syracusan Gks. in 664 B.C. and called Acre: there are sev. anct. remains. Pop. 13,100.

Palazzolo sull' Oglio, tn. in the prov. of Brescia, Italy, with trade in silk and cotton. Pop. 12,100.

Palazzo San Gervasio, tn. in the prov. of Basilicata, Italy, 6 m. W.S.W. of Spinazzola. Pop. 8700.

Palembang, dist. and tn. of Sumatra, Indonesia, 45 m. from the mouth of the Musi, or P. R. The dist. is marshy, and many of the inhab. live on rafts. One of the chief buildings of interest in the tn. is the sultan's palace. P. is the most important commercial city in the Is., the chief industries, apart from the production of oil, are wood-carving, silk-weaving, and the manuf. of gold and ivory ornaments. Dyewoods and gutta-percha are exported. P.'s output of 4,250,000 tons of petroleum annually in years before the Second World War represented 55 per cent of the net total output of the Netherlands E. Indies; hence, after the loss of Tarakan and Balikpapan, it was the only big oil-producing centre left to the Allies in this area after 1942. The Jap. landed 700 paratroops on P. (Feb. 14) and the Dutch forces wiped out two of the Jap. forces on the spot. The Dutch, however, before the Jap. landed troops from the sea, destroyed installations, refineries, and equipment. Dutch, Brit., and Amer. warships took heavy toll of the Jap. landing barges and attacked Jap. warships and transports. Brit. Hurricanes also took part in the struggle. But the Jap. succeeded in landing invasion forces on Feb. 16 and P. was lost. The residency has an area of 33,173 sq. m. Pop. 1,099,000. Pop. of cap. 109,000.

Palencia, Alonso de, or Alphonsus Palentinus (b. c. 1423, d. after 1492), Sp. historical geographer. He studied under George of Trebizond in Italy, and was appointed royal historiographer by Alfonso, brother of Henry IV. of Castile, later attaching himself to Isabella of Castile. His works include a *Chronicle of Henry IV.* (1454-74); *Decades* (in Lat., down to the taking of Haza from the Moors); *Los Libros de Flavio Josepho* (1491); *El Universal Vocabulario en Latin y Romance* (Sp.-Lat. dictionary) (1495); and *Las Vidas de Plutarco* (1508). See N. Antonio, *Bibliotheca Hispana vetus*, 1784; D. Clemencin, *Elogio de la Reyna Catalica*, 1821; and W. H. Prescott, *History of Ferdinand and Isabella*, I., 1842.

Palencia: 1. Prov. of central Spain, bounded by the provs. of Santander, Burgos, Valladolid, and Leon. It is fertile and well watered by the Carrion and other grain, as well as wine, honey, and fibres and woollens are extensively manufactured and exported. Area 3093 sq. m. Pop. 226,600. 2. Episcopal city and the cap. of the above prov., 27 m. N. by E. of Valladolid. It is an anct. walled city, with a fine cathedral, founded in the fourteenth century. In the twelfth century

P. became the seat of the Cortes and of the Castilian kings. It has important manufs. of blankets, balze, leather, cotton, porcelain, soap, etc., and possesses hospitals, barracks, and a bull-ring. Pop. 20,000.

Palenque, vil. of Chiapas, Mexico. It is celebrated for its ruins of anct. temples, the finest of which is called the Great Palace. There are ten detached buildings in all, amongst which are the Temple of the Cross, the Temple of Inscriptions, and the Temple of Beau Relief. See W. H. Holmes, *Ancient Cities of Mexico*, 1895.

Paléologue, Georges Maurice (1859-1944), Fr. author and diplomat, b. in Paris, of an old Byzantine family (see PALAEOLOGUS). Educated at Lycée Henri IV., he held diplomatic posts in Tangier, Rome, Germany, China, Korea, and Bulgaria, was ambas. to Russia, 1914-17, and secretary-general of the Ministry of Foreign Affairs, 1920-21. Works include *L'Art chinois* (1888); *Vauvenargues* (1890) and *Rome, impressions d'histoire et d'art* (1902), both crowned by the Academy; *La Russie des tsars pendant la Grande Guerre* (1921-22); *Le Roman tragique de l'Empereur Alexandre II* (1923); *Cavour* (1926); *Les Entretiens de l'impératrice Eugénie* (1928); *Un Grand Tournant de la politique mondiale, 1904-5* (1934); *Guillaume II. et Nicolas II.* (1935), and *Alexandre Ier* (1936). In 1928 he was elected to the Academy.

Palermo: 1. Prov. of N.W. Sicily, Italy, covering an area of 1927 sq. m. All along the coast-line are extensive bays and bold promontories, and a branch of the Neptuman Mts. traverses the interior from E. to W. Sulphur, marble, olives, figs, and wine are the chief products. Pop. 998,900. 2. Cap. of the above prov., on a bay of the same name, in the N.W. corner, and 120 m. W. of Messina. It is the see of an archbishop, and has a magnificent Gothic cathedral commenced in 1180, containing the tombs of two emperors and an archbishop. There are also a royal palace and a univ., founded at the end of the fourteenth century. P. has a good harbour and a fine promenade, the Marina, about 80 yds. wide, stretching for a mile along the bay. The prin. products are wines, oranges, lemons, sulphur, essences, etc. The fisheries are productive, and the industries include boat-building, glove-making, and iron and marble work. P. is a tn. of early Grecian origin, and was a stronghold of the Carthaginians until their defeat by Rome in the Punic Wars. In A.D. 1071 it became the Norman cap., and afterwards that of the Angevins and their Sp. successors. Garibaldi, finally liberated the city from the Bourbon kings of Naples in 1860, when it was annexed to Sardinia. P. was taken by Gen. Patton, commanding the Amer. Seventh Army, on July 23, 1943. Much damage was done to the city during the allied invasion of Sicily in 1943; but all the famous Norman buildings, with their twelfth-century mosaics, are, almost without exception, intact, and the cathedral escaped damage. Pop. 465,300. See C. Diehl, *Palermo et Syracuse*, 1907.

Palestine, city and the cap. of Anderson co., Texas, U.S.A., 151 m. N. of Houston. It has a cotton compress and iron foundries. Pop. 12,100.

Palestine, anct. and biblicl country lying at the extreme E. end of the Mediterranean, to the S. of Syria. It forms a N.W. strip of Arabia balancing the S.E., El Yemen. The commonest term for it in the Heb. Bible is 'the Land of Canaan' (*Eretz Kena'an*). It is also known as the Holy Land, as the Land of Israel (*Eretz Yisrael*), and, in part, as Judaea. The term P., a Gk. word (*Παλαιστίνη*), which means 'Philistine-land,' is used for the whole country first by Herodotus (fifth century B.C.). Originally, however, the term P. (*Heb. Philistia*) was applied to the mere strip of coast lying between Joppa (mod. Jaffa) and Gaza (see Exod. xv. 14), but, like the term Canaan and other geographical terms, it gradually was employed to denote the whole country.

BOUNDARIES.—P. is a historical-geographical expression rather than a political entity. The area contained within its boundaries varied from time to time. The natural and historic boundaries of P. run on the S. from the gulf of Aqabah across the desert of Sinai to the Mediterranean coast. Desert country borders its E. frontier also. Its W. limit is the Mediterranean Sea. The N. limits are difficult to determine; it may be said, however, that they run from the desert on the E., along the slopes of Mt. Hermon over to the Litani R. and where the Lebanon and Anti-Lebanon first break into a series of elevated plateaus, and thence over to the Mediterranean coast. P. is about 150 m. in length from N. to S., with a width of about 35 m. at the N. and about 110 m. at the S., its area being about 13,000 sq. m. (approximately that of the Netherlands). Under the Brit. mandate P. was bounded on the N. by the Fr. mandated terr. of Syria and Lebanon, on the W. by the Mediterranean, on the S. by Egyptian and Hejaz terr., and on the E. by Transjordan, though this was also included in the Brit. mandate. The N. boundary was settled by an Anglo-Fr. convention of 1920, and ran from the Mediterranean, between Tyre and Acre, across the Upper Jordan valley to Banias, and thence again S. to the N.E. shore of Lake Tiberias and to Samakh.

HISTORICAL-GEOGRAPHICAL SETTING.—Though the country was small, its situation was and still is one of very great strategic importance. P. forms a bridge between Asia and Africa, and in anct. times it formed the main communication between the great empires of Babylon and Assyria, important centres of civilisation on the Tigris and Euphrates, and Egypt, which through many centuries was one of the great world powers. P. was the bridge over which flowed all the traffic between these great commercial powers. Another stream of traffic, less considerable, crossed the country in another direction, from S. Arabia to Phœnicia. Culturally, also, P. drew continuously from Egypt and the valley of Euphrates, and as nearly all important elements of anct. culture

originated in one or the other of these two centres, P. became acquainted with all significant developments of anct. E. civilisation. But not all the traffic that passed over the bridge was peaceful. The rivalry between Egypt and the Mesopotamian powers was inveterate. Whenever their armies advanced to attack one another the route led necessarily through P.; therefore P. became an international battleground and a pawn in the game of war. It is this position, with its fundamental significance, also in its later hist., which renders P. unique. P. has, besides, always been the 'refuge of the drifting populations of Arabia'. Never sought for itself alone, except by the Hebs. and the crusaders, P. has been overrun constantly by invaders from the N. seeking Egypt, or

Galilee and Samaria, and falls away steadily and broadly as the Nogob or S. country. N. of Esdraelon this range runs up to the mts. of Lebanon, of which indeed it is the S. extension. In the N. of Galilee its peaks reach a height of about 4000 ft. The main divs. are based on the geological formation; limestone rocks form two folds with a great synclinal valley between the valley of the Jordan; the cretaceous limestone of the Central Range passes under the calcareous sandstone of the Shephelah, which is overlaid by the raised beaches and sea-beds of the Maritime Plain. The Jordan valley forms a deep fault in the earth's crust. From the small lake Huleh or Waters of Merom, just above sea level, the lt. Jordan runs in a narrow valley, dipping so



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A GALILEAN LANDSCAPE: ON THE RIGHT IS MOUNT HERMON

by the return attack. Thus the Hittites, Egyptians, Assyrians, Babylonians, Persians, Gks., Syrians, Arabs, and Seljuk Turks in turn devastated it. Alexander passed through to Egypt in 331 B.C.; the wars of the Seleucides and Ptolemies passed over it; Pompey in 63 B.C. brought it under Rom. rule; the crusaders estab. themselves there from 1099 to 1187; Napoleon in 1799 abandoned his first ambition on its soil. Yet its destiny was typified by the Arab conquest in A.D. 640; there is everything to attract the desert tribes, but nothing for others except the religious sentiment of Christians and Jews, which later, linked with national consciousness, has given the latest impetus to the hist. of P. (see *Modern History*).

PHYSICAL FEATURES.—The land divides simply into the Maritime Plain (subdivided into the fertile plain of Sharon, from Mt. Carmel to Joppa, and the sandy plain of Philistia, to the S.) along the coast, the Shephelah, or low hills, the Central Range, the Jordan valley, and the E. Range; the Central Range is further broken by the plain of Esdraelon between

steeply that on reaching the sea of Galilee it is almost 700 ft. below sea level. The descent continues, but not so steeply; the riv., however, contrives in its wanderings to travel about three times the actual distance (which is about 65 m.) between the sea of Galilee and the Dead Sea (Arabian *Bahr Lûl*). The latter is 1292 ft. below sea level. S. of the Dead Sea, in which the riv. loses itself, the valley (known as Wadi 'Arabah (Arabian *Ghôr*)) continues through the desert and gradually rises to the head of the gulf of Aqabah. There are hot springs in the bed of the Dead Sea, and the strata are bituminous; in addition there is no outlet, and evaporation leaves the water both dense and bitter. Its banks are largely of marl fringed with clean gravel. Within the Ghôr and about the Dead Sea were the 'five cities,' Sodom, Gomorrah, Admah, Zebolim, Zoar. The Ghôr has a tropical heat and rank vegetation, thorn bush and broom, and jungle of cane and oleander; it abounds in marsh with its accompanying malaria. Jericho has been its only tn. Beyond these main natural divs., again, the land is cut up into distinct and separated

parts well reflected in the anct. tribal divs., and giving an independent character productive of internal unrest.

East Palestine, from Hermon to the S. end of the Dead Sea, has three rivs., the Arnon, Jabbok, and Yarmuk, flowing due W. into the Jordan. Hauran, corresponding to the anct. Trachonitis and Auranitis, a volcanic region covered with a basaltic lava, and showing characteristic denudation, lies N. of the Yarmuk and is partly (in the N.) barren. The tableland rises steeply to 2000 ft., the W. wall sloping more gradually to between 800 and 1500 ft. of the Central Range. To the E. there is the Hauran mt. range, now the home of the Druses. Jaulan, to the W., corresponds to the Gk. Gaulanitis. The S. part of the Hauran is well watered, and probably coincides with the dist. known in the Bible as Bashan and later as Batanea. This was regarded by the Hebs. as an especially fertile area. Between the Yarmuk and the Jabbok (Zerqa) are forested high ridges, the Gilead of the Bible, the Galaaditis of the Gks., while S. again lies the treeless plateau of Moab, with Ammon to the N.E. This whole dist., called by the Arabs El Belka, was known in Rom. times as Peræa; then it was Jewish, while the ter. N. of the Yarmuk was mainly pagan.

HYDROGRAPHY AND VEGETATION. The hydrography of P. is typical of limestone country, with the addition of summer drought. The streams are plentiful and full in the hills in the rainy season, but soon become dry; in the Maritime Plain surface water is scarce, but is readily obtained by digging. Judæa has few springs, and water is stored in wells from the winter rains. As a consequence of this irregularity the soil and vegetation are similarly varied, from the tropical vegetation of the Jordan valley to the barren moorland and desert. W. of Jordan the land is park steppe tending towards scrub. Trees include the oak, terebinth, carob, box, pine, cypress, plane, walnut, sycamore, palm, acacia, and shittim-wood. Much of the woodland consists of dwarf trees, the wild olive, vine, arbutus, myrtle, juniper, and thorn. Of fruit there is plenty: the apricot, fig, orange, date, citron, pomegranate, mulberry, pistachio, almond and walnut, olive and grape. Wheat, barley, millet, maize, beans, pulse, lentils, tomatoes, onions, cucumbers, pumpkins, and melons are cultivated, but pasture is wild, short-lived, and sparse, though of excellent quality.

CLIMATE. There is every range of climate from the sub-tropical of the lower Jordan to the sub-alpine of the upper. On the Maritime Plain one is in Egypt; in the Shephelah in Italy; Judæa resembles inland Italy, and Moab inland Algeria. However, even in the winter the temp. only exceptionally falls below freezing-point. There are two seasons; the winter rains, commencing about Oct. and lasting till April, with typical desert fringe thunderstorms and hail, and snow on the mts.; and the summer drought, with occasional morning mists, and regular heavy dews at night, while the heat of the

day is sultry. The rains are brought by S.W. and W. winds, the drier N.W. blowing in the summer, and with an approach to land and sea breeze conditions. In spring the Sherkiyeh (sirocco), the hot desert wind, is common. The temp. tends to extremes and sudden changes, but in Judæa is more equable; here the mean ann. temp. varies from 62° to 68°; 90° in summer, 46° in Feb. Throughout the land the climate is healthy, bracing, regular enough to induce steady labour, variable enough to produce anxiety and care. The lower Jordan valley, cut off from the sea breezes, is intensely hot. This heat causes rapid evaporation from the sea of Galilee and, especially the Dead Sea, and explains the fact that despite the millions of tons of water which the latter receives daily from the Jordan, its level does not rise.

ARCHÆOLOGY.—Archæology and hist. in P., as elsewhere, are complementary and interdependent studies. Various museums in Europe, America, and Asia preserve Palestinian antiquities; the most important of them is the P. Museum of Jerusalem, built with a gift of \$2,000,000 from John D. Rockefeller, junior.

P. has always been a lure to the archæologist, especially for those who have worked to establish the historical accuracy of the Scriptures. Sober appraisal should be made of the nature, extent, and limits of the actual contribution which archæology makes to our better understanding and true appreciation of the Bible. The great spiritual experiences deposited in the Bible cannot be tested by any material, historical, or literary evidences. On the other hand, the brilliant achievements of the last decades in the field of Palestinian archæology have greatly added to our knowledge of the world in which Israel was set. Archæology fills many gaps in the Bible, explains and illustrates many passages which otherwise would remain obscure.

Scientific surface exploration of P. may be said to have begun in 1838. In that year the Amer. theologian Edward Robinson, prof. at the Union Theological Seminary of New York city, started his extensive observations, which he continued until 1852. In 1865 the P. Exploration Fund (q.v.) was estab., and its first representative, Charles Warren, a Brit. ordnance officer, made a series of sketch-maps of the country, and (in 1867) carried out excavations on the Temple hill of Jerusalem. In the years 1872 to 1878 the P.E.F. made a thorough survey of W. P. under the leadership of C. R. Conder and H. H. Kitchener (Lord Kitchener). The Amer. P. Exploration Society, in 1870, and, in 1898, the Deutsche Orient-Gesellschaft, as well as various other European and Palestinian societies, were founded on the model of the Brit. organisation. W. M. Flinders Petrie, who in 1890 excavated the mound (or *tell*) of Tell el-Hesi, in S.W. P., may be considered as the father of modern archæology of P. There was considerable archæological activity in P. in the years following the First World War; from 1921 to 1936 no

year passed without sev. excavations. The lead was then taken by Brit. organisations (P.E.F., Brit. School of Archaeology, Wellcome Archaeological Expedition, etc.), often in co-operation with Amer. organisations (Amer. School of Oriental Research, Univ. of Chicago, etc.) or the Heb. Univ. of Jerusalem.

Among the most notable excavations carried out recently are those by the Univ. of Pennsylvania Museum at Bethshan (1921-33), by the P.E.F. and the Brit. School of Archaeology on the Ophel hill in Jerusalem (1923-28), by the Univ. of Chicago at Megiddo (1925-39), by Prof. Harastat at Jericho (1929-36), by the Amer. Schools of Oriental Research in Jerusalem, directed by Prof. W. F. Albright, at Tell en-Nasbeh (1926-35), at Tell Beit Mirsim (1926-32), by Prof. Elihu Grant at Beth Shemesh (1928-33), by the Brit. School of Archaeology in Jerusalem and the Amer. School of Prehistoric Research at Mt. Carmel (1928-34), by Flinders Petrie at Tell el-Ajjul (anc. Gaza) (1930-34), Tell Jemmeh, and Tell el-Far'ah, by the joint Brit.-Amer.-Heb. Univ. expedition at Samaria (1931-1935), by the Wellcome-Marston Expedition at Lachish (Tell ed-Duweir) (1932-1938), where the famous 'Lachish Letters' were found, and numerous shorter excavations. Recent excavations are those of the Jewish P. Exploration Society at Beith Shearim (modern Sheikh Abreik) (1936-40) and Khirbet Kerak (=anc. Beith Yerah) (1944 onwards). The most important discovery which has ever been made in regard to biblical MSS. was in the summer of 1947, when a number of MSS. were found in an anc. cave in the cliffs above the Dead Sea. It will take the scholars many years of study to exhaust all the implications of this remarkable find. See SCROLLS OF THE LAW.

PREHISTORY.—Our historical information concerning P. before the time of the Hebs. is very limited. Indeed the hist. of P. in the ordinary sense does not go back further than the second millennium B.C. Such information as can be gathered about the earlier times is derived almost exclusively from the discovery of excavators and the research work of geologists and archaeologists (see preceding section). It seems that in the Tertiary Age P. rose above the sea, and after much oscillation attained what were roughly its present boundaries; and less than 2,000,000 years ago the tectonic movements in the earth's crust culminated in the great 'left' which is known in its modified form of to-day as the Jordan valley; at the same time upheavals of rock deposits created the hill country of W. P.

P. appears to have been inhabited at a very remote period. The earliest inhab. belonged to the Early Palaeolithic period; they lived in caves in which they left traces of their occupation. The oldest cave deposits are assigned to the Acheulian phase (perhaps 180,000 years ago). On Mt. Carmel, in a Middle Palaeolithic cave deposit (belonging perhaps to 150,000 years ago), a dozen human skeletons were found, and sev.

more were discovered in a cave S. of Nazareth. The Carmel man seems to represent a mixed race, intermediate between Palaeanthropic man (*Homo neanderthalensis*) and Neanthropic man (*Homo sapiens*). There followed various Late Palaeolithic and Mesolithic phases, each one lasting many thousands of years.

Of Neolithic men in P. (perhaps 6000-4500 or 1000 B.C.) much more is known. They left behind them numerous monuments of stone such as menhirs (q.v.), dolmens (q.v.), and cromlechs (q.v.), perhaps the biblical *gigal*. Perhaps about 4500 B.C. copper made its first appearance in P.; gradually it became more abundant, and partly replaced stone as a material for tools. This period is known as Chalcolithic, i.e. 'copper (or bronze)—(and) stone'; it was the transitional period between the Neolithic and Bronze Ages. Whatever may be the case with the Palaeolithic inhab. of P., according to Prof. Albright, the leading Amer. orientalist, Hamito-Semitic tribes already appear during the Mesolithic period, nearly 10,000 years ago, and (although later there were many movements of non-Semitic peoples across P.) the Semitic element remained primary in the ethnic make-up of P. ever since. The true hist. of P. begins with the invasion of the Israelites in the thirteenth century B.C. (after their exodus from Egypt), and with the invasion of the 'Sea Peoples' in the early twelfth century B.C. (see next section, *Ancient History*).

ANCIENT HISTORY.—(For the traditional hist. of the Israelites see under ISRAEL.) By 1100 B.C. the Israelites had occupied most of the hill country in P. and they were already distinguished from the Phœnician people of the coast and the Semites of the desert beyond the Jordan by their peculiar religion. Hostile pressure, especially from the Philistines, led to the setting up of a monarchy; and under David (c. 1000-970 B.C.) and Solomon (c. 970-930 B.C.) the Israelites were effectively united, the Philistines and other enemies defeated, and the power of the new kingdom was extended over all P. But on Solomon's death a decline set in. The coastal people regained their independence; the N. tribes established a separate kingdom of Israel centred on Samaria, often at war with the kingdom of Judah, in which, principally because Solomon's temple in Jerusalem was the visible symbol of the Heb. faith, the tradition of Heb. culture was thenceforth mainly concentrated. This 'partition' of P. rendered easier its subjection to whichever should become the stronger of the neighbouring empires, Egypt or Assyria. The two Israelite kingdoms and the coast tns., however, succeeded in keeping a precarious independence for two centuries, but in 721 the first blow fell. The N. kingdom became merged in the Assyrian Empire, Samaria was destroyed, and the wealthier sections of the people were deported to other lands. By 587-586 B.C. Judah suffered a like fate. Jerusalem was sacked and deprived of its defences

and equipment and a great part of the pop. removed to Babylon. The 'captivity,' however, did not last long, for in 538 B.C. Cyrus allowed the Judean exiles to return to their country and some 40,000 returned to their homeland, rebuilt the temple, and reconstituted their life in a small inland state. Our evidence for the hist. of P. during the Persian period (538-330 B.C.) is both confusing and scanty. It seems, however, that there was a semi-autonomous state called Yehud (Judaea). After the conquest of P. by the Seleucid rulers of Syria came the earliest persecution of the Jewish faith, but under the lead of Hasmonaeans or Maccabees the Jews revolted, and from 142 B.C. recovered the long lost independence of Judaea and even extended their rule almost to the old limits of David and Solomon. Then in 63 B.C. Pompey stormed Jerusalem and never afterwards was P. independent. The Jews, however, were determined not to yield without a struggle, and in A.D. 66-70 Titus concluded a long and difficult campaign by sacking Jerusalem and destroying the temple. After crushing a further revolt in A.D. 132-35 the Romans ploughed the site of Jerusalem and drove many of its pop. into slavery. From that time onwards P. steadily declined into obscurity and its reduced pop. diminished still further. While the Jews, who had scattered themselves over much of the rest of the world, increased and multiplied, soon only a few thousand of them were left in their old homeland of P. Thus ended the hist. of anc. Jewish P.

MEDIEVAL HISTORY.—For over 500 years P. remained under Rom. or Byzantine rule and then, in the seventh century, the Arabs, inspired by the rise of Islam, in their great Mediterranean conquests included Syria, which also embraced P. But whatever the achievements of the golden age of Arab rule, P. played no great part, and the only outstanding work of art which has survived from the age of Arab independence is the Dome of the Rock, erected at the end of the seventh century. But in one respect Jerusalem attained a higher place in the Arab world than Bagdad, Granada, or Cairo: Mohammed placed the scene of his ascent to heaven on the site of the Jewish temple in Jerusalem. In the course of the next 400 years the Arab empire disintegrated, and from A.D. 1099 P. was exposed to the series of invasions known as the crusades, which maintained a precarious kingdom of Jerusalem until the late twelfth century, after which the whole of P. reverted to Muslim rule. In 1517 P. was conquered by the Ottoman Turks and under the rule of the Ottoman sultans at Constantinople it remained, except for a few months of Napoleon's invasion and the few years of Mohammed Ali's occupation, until the First World War.

MODERN COLONISATION.—Prior to the First World War the Gers. made sev. attempts at colonisation, notably at Haifa and Jaffa, and many Jewish colonies were estab. at Peta, Tiqvah, Rishon-le-

Ziyon, Gadera (settlements for wine and orange cultivation), Lower Galilee (between the years 1901 and 1907), and mixed farming settlements under the Zionist organisation at Dagan, Tel Hal, Kinnereth, and elsewhere; Circassian colonies existed (and still exist) at Jerash, Amman, Kaysariyah, and elsewhere in Transjordan (q.r.). These colonies made a beginning towards the restoration of the land to its former flourishing condition. There was also an appreciable increase in philanthropical, educational, missionary, and monastic settlements. The Jordan valley S. of the sea of Galilee became the private property of the sultan, and some improvement took place there. After 1921 there was a wide extension of the colonisation of the Zionist organisation to large connected areas, especially in the vale of Esdraelon.

MODERN HISTORY.—*Palestine under British Mandate:* P. was taken from the Turks in 1917 by Gen. Allenby (q.r.). At noon on Dec. 9 a Turkish *parlementaire* conveyed the surrender of Jerusalem to Allenby, who made his official entry two days later (see PALESTINE, OPERATIONS IN). The Brit. conquest paved the way for the Balfour Declaration (q.r.), and this historic declaration, far-reaching in its consequences and repercussions, was endorsed by the allied powers in the treaty of Sevres, 1920, which provided that the country should be entrusted to a mandatory power under the League of Nations. At San Remo, in 1920, the Allied Powers' Supreme Council entrusted the mandate to Great Britain. A body, then styled the Zionist Commission, and consisting of representatives of the constituent federations of the World Zionist organisation, was set up to act as a link between the Brit. administration and Zionist interests. This body was known as the P. Zionist Executive. It was financed by Jews all over the world and did valuable work in the interests of Jewish education, agriculture, and colonisation in P. The Brit. military administration (1917-20) conferred many benefits on P., including sanitation, public gardens, and chambers of commerce. Large sums were spent on road improvements, bridges were rebuilt, and a steel bridge was thrown across the Jordan. There were occasional minor disturbances early in 1920 in various parts of P. Again, in 1921, there was rioting in Jaffa, which developed into racial strife, but no serious outbreak occurred until Aug. 23, 1929, when grave disorders broke out in Jerusalem over the Walling Wall (q.r.). Similar disorders were especially grave in Hebron, but also spread to other parts of the country, order being restored, however, by the end of the month, after troops had been sent from Malta and Egypt. A commission was set up by the Brit. Gov., under the chairmanship of Sir Walter Shaw, to inquire into the causes of the outbreak, and to make recommendations as to the steps necessary to avoid a recurrence. (Report, Cmd. 3530.)

From then until the outbreak of the Second World War the administration of P. was chequered by Muslim-Jewish

hostilities, which presented formidable difficulties to the mandatory. At times the Brit. Gov. seemed to lean in favour of the Jews, and at other times to discourage the Jews in favour of the Arabs. This was especially remarked in the White Paper of 1930, which seemed to be a rebuff to the too rapid development of the Zionist experiment, but which merely reaffirmed Brit. policy in the matter of carrying out the Balfour Declaration. This famous declaration was dual in its purpose, and called for the exercise of the finest sense of justice and equity towards the indigenous pop., while not losing sight of the fundamental purpose of the pledge given to the Jews.

The immigration of Jews has always been regarded with the greatest hostility, overt or otherwise, by the Arabs. From 1929 there was a marked decline in emigration, with only a slight decline in the immigration, of Jews. In 1932 immigration rose to 8553, the first of four consecutive leaps which were to transform the situation by the beginning of 1936. With the growth of immigration went a corresponding growth in the amount of capital invested in the national home, especially by Amer. Jews, and in its agric. and industrial production. Meantime, however, the economic position of the Arabs continued to improve. But the Arabs began to claim that they had been displaced from lands owing to Jewish purchases, especially from absentee Arab landowners, and ordinances were passed to check this tendency, which might eventually have created a large landless Arab proletariat. There was relative tranquillity in P. between 1930 and 1933, but under the quiet surface was smouldering a fierce Arab antagonism to the whole conception of the national home. In 1933 Jews fleeing from Germany under the Nazi regime sought asylum in P. and in that year immigration jumped to 30,327, 5392 coming from Germany and 13,125 from Poland, and the national home benefited in every way materially. It is true that the Jewish money which came in all-spelt prosperity for the Arabs, but that did not appease the latter, and the first open manifestation of the rising Arab temper was the pub. by the Arab Executive Committee in 1933 of a manifesto to the 'Arab nation' which, in effect, demanded the expulsion of all foreigners. Finally in Oct. 1933 the Arab Executive announced a general strike at Jerusalem, and the trouble soon spread to other parts of P. The difference between this outbreak and its predecessors was that previously the Arabs attacked the Jews, but now they attacked the gov. on the plea that they were allies of the Jews and enemies of the Arabs. Yet in this disturbed atmosphere the national home continued to grow. In 1934 there were no fewer than 42,359 'authorised' Jewish immigrants, and in 1935 61,854. The principle of 'economic absorptive capacity,' laid down over ten years previously, was almost stultified, for the Jews now claimed that this enhanced immigration in itself actually increased that capacity and the

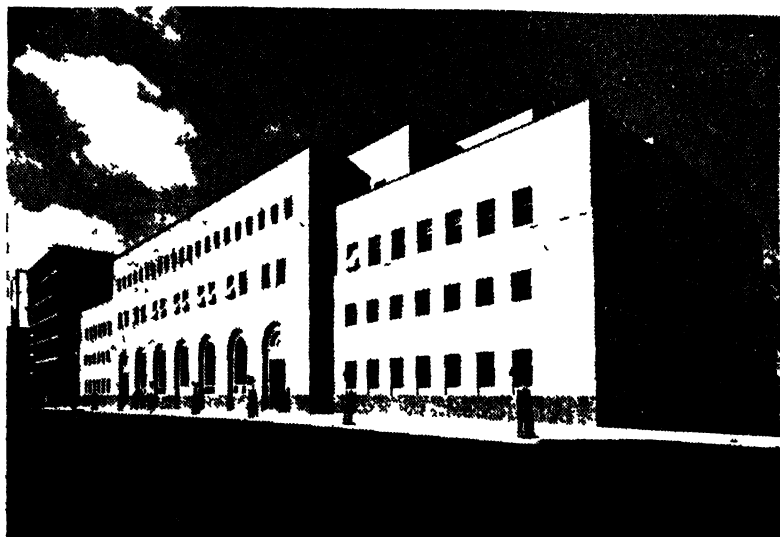
Arabs naturally supposed that at no great distance of time they might find themselves outnumbered. It became evident that the longer the mandate operated the stronger and more bitter became Arab opposition. The various Arab political parties jointly demanded the estab. of a democratic gov., the prohibition of land transfer to Jews, and the cessation of Jewish immigration. The two latter demands were precluded by the mandate, unless it could be shown that land purchase and immigration were definitely injuring the rights and position of the Arabs; while as to the first demand, the gov. temporised by bringing forward a proposal (the second since the mandate) for the estab. of a legislative council. The Arabs, in a spirit of perversity, accepted the proposal only because the Jews were opposed to it, for it was clearly far removed from the Arab ideal of independence. It was, however, rejected by the Brit. House of Commons. This was unfortunate in its effect on Arab opinion, which assumed that the Commons were dominated by Jewish influence, though it is but fair to point out that, even if the Commons had accepted the P. Gov.'s proposal, it would not long have satisfied the Arabs. In 1935-36 the political developments in Egypt (q.v.) and in Syria (q.v.) stimulated the Arab nationalist agitation in P.

In such circumstances it is not surprising that in 1936 the disturbances broke out which occasioned the appointment of the Peel Commission (Aug. 7, 1936). In the course of 1936 Arab work and trade were virtually at a standstill, and Arab shops were closed. An Arab 'Higher Committee' was formed which became a kind of *imperium in imperio*, and by June of that year the strike hardened throughout the country. Violence and sabotage increased. Roads were barricaded and trains derailed. Armed bands appeared in the hills, including volunteers from Syria and Iraq. Military reinforcements came from Malta and Egypt for the defence of key-points. By Aug. these bands were strengthened in numbers and arms and were joined by trained guerilla leaders from outside P. In September extensive military operations were set on foot by the Brit. Gov. with a view to rounding up the bands, and over 20,000 Brit. troops were now in P. and martial law was authorised. Then came appeals from the Arab kings of Saudi Arabia, Transjordan, and Iraq to the Arab Higher Committee and the disturbances as an organised national movement ceased. It was then that the Peel Commission went out to P. The main recommendation of this commission, which reported in July 1937, was the partition of P., an independent Jewish state to be formed out of the predominantly Jewish-settled dists. along the coast and in the N., while the rest of P. was to become an independent Arab state. Jerusalem and Haifa were to remain under Brit. administration and the Arabs were to get a corridor to the sea near Jaffa. The scheme was rejected by both Arabs and Jews and received such severe criticism

in the House of Commons that it was in effect put back for further consideration, despite the fact that its major recommendation had already been accepted by the gov. Another commission, known as the Palestine Partition Commission, went out soon afterwards, and on their report against the practicability of partition, the Brit. Gov. came to the conclusion that the political, administrative, and financial difficulties involved in the Peel Commission's proposal to create independent states were so great that that solution of the problem was impracticable and it was dropped. Then came the Palestine Conference in London (Feb.-

was cut short by the outbreak of the Second World War, during which Arabs and, especially, Jews seemed to lay aside their grievances in their willingness to support Britain in the fight. For the proposals of the Anglo-Amer. committee of 1916, and of the United Nations committee of 1947, see BALFOUR DECLARATION.

Government and Constitution.—Under Turkish rule, part of P. was in the vilayet of Beirut and part in the independent sanjak of Jerusalem. After it was conquered in 1917-18 by Gen. Allenby, the country was placed under Brit. military administration until July 1920, when Sir Herbert Samuel was appointed



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March 1939); but as the Jewish and Arab delegations would neither meet nor agree on any compromise, the Brit. Gov. issued its own statement of policy in a White Paper pub. in May 1939. In this the gov. declared that it was no part of their policy that P. should become a Jewish state and that in their view the MacMahon-Hussein correspondence (exchanged in 1915 between Sir Henry McMahon, high commissioner in Egypt, and the sheriff of Mecca, on the terms on which the sheriff was prepared to co-operate with Great Britain against the Turks) in no way supported the Arab claim for an independent Arab state; and that the gov.'s objective was ultimately an 'independent Palestinian state,' the two peoples sharing authority 'in such a way that the essential interests of each were secured.' Jewish immigration was to be restricted; the Peel Commission's partition scheme was rejected. But further discussion of policy

High Commissioner and a civil administration was estab. by the treaty of Lausanne (q.v.), 1923. Turkey renounced all right over P. The mandate given by the League of Nations to Great Britain came into force on Sept. 29, 1923, and under its terms Great Britain was responsible for carrying into effect the terms of the famous Balfour Declaration (q.v.) of Nov. 22, 1917. Under that declaration the Brit. Gov. projected the estab. in P. of a national home for the Jewish people, it being understood that nothing should thereby be done to prejudice the civil and religious rights of existing non-Jewish communities in P. or the right and political status enjoyed by Jews in any other country. A new constitution was promulgated on Sept. 1, 1922. It provided for the appointment of a High Commissioner and Commander-in-Chief, an Executive Council, and a Legislative Council. But no Legislative Council

was (or ever has been) elected owing to the persistent refusal of the Arabs to take part in the elections. To meet this emergency the High Commissioner, under an Order in Council of 1923, formed an Advisory Council composed of a number of the chief officials, to enact the necessary laws. Under the constitution Eng., Arabic, and Heb. were the official languages of P. The country was divided into six dists., Jerusalem, Lydda, Haifa, Galilee and Acre, Samaria, and Gaza, administered by dist. commissioners. In 1927 regulations were made for the organisation of the Jewish pop. as a religious community, with autonomy for its internal affairs, religious, cultural, and communal. This community had a Chief Rabbinate, an Elected Assembly, and a General Council (*Va'ad Leumi*) elected by the Assembly to represent the community in its dealings with the gov. The Brit. Gov. and the P. administration recognised the Jewish Agency as representing the Jewish people in all matters appertaining to the building up of the Jewish national home. The Muslim Supreme Council was constituted by the High Commissioner in 1921 to control Muslim affairs in P. This Council consisted of a president (*Rais-ul-Ulama*) and four elected members. It controlled the appointments of officers for the Sharia courts and for the *Waqfs* (Muslim religious endowments). There were (1943) twenty-four municipalities. Election to municipal councils was regulated by an ordinance of 1934. Much was done by the municipal corporations in tn.-planning, street construction, and drainage. In rural areas local affairs were administered by local councils. Law courts were either civil or religious, the former exercising jurisdiction in all save questions of personal status or charitable endowments, which were dealt with, amongst similar matters, by the Jewish, Muslim, and the sev. Christian courts. The Supreme Court consisted of a Brit. Chief Justice with three Brit. and four Palestinian judges. In 1937 the Ottoman code was replaced by a criminal code based on Eng. law.

Education.—Under the mandate there was a dual system of gov. schools for Arabs and Jewish schools administered by the council of the Jewish community.

Production and Industries.—P. is, generally, fertile: cereals, olives, melons, citrons, and other fruits, olives and wine are produced. Oranges are grown chiefly in the Jaffa dist. Sheep and goats do well, both in the lowlands and on the mts. Olives are second in importance only to citrus: considerable areas, especially in the hills, are also planted with vines and figs; apples, pears, and plums are also grown. Vegetables and fruit, particularly bananas and sub-tropical fruits, are grown in the Jordan valley. Tobacco is cultivated in the Acre-Galilee dists. The minerals found include limestone (most parts of the country), gypsum at Mt. Gipsia (Galilee), sandstone in the coastal area; rock-salt in the Jordan valley and the Dead Sea shore; sulphur, sodium, and magnesium chloride, and chloride of potash. Petroleum and

bitumen exudations occur around the S. part of the Dead Sea. A concession for the exploitation of Dead Sea salts was granted to Palestine Potash Ltd. in 1930. Medicinal hot springs occur at Tiberias and elsewhere in the Jordan valley. The industries of chief importance for the export trade are wine-making, soap-boiling, olive oil, tanning, cement, and some textiles, the prin. manufacturing centres being Tel Aviv, Nablus, Acre, and Haifa. Durra, sesame, lentils, and edible oils are also exported. Citrus exports fell off during the Second World War, when more attention was given to concentrated juices and essential oils. The imports include chiefly rice, sesame, flour, sugar, petroleum, textiles, building materials, automobiles, and machinery. There are a number of nurseries for the raising of forest trees and fruit stock. A proportion of the uncultivated land has been declared as 'forest reserves.' There are, besides, tobacco factories and a cigarette factory. In 1941 thirteen factories produced about 1000 tons of cigarettes, tobacco, tobaccos, heishah, snuff, and cigars. Other products include artificial teeth and chemicals. Exports in 1938 and 1939 were valued at £5,000,000; in 1940, £2,114,000; 1941, £1,362,000; imports averaged £12,000,000 for the four years.

Shipping and Communications.—The chief ports are Haifa and Jaffa. Acre and Gaza are also ports of entry for sailing vessels. At Jaffa and Tel Aviv large vessels anchor at open roadstead. In 1939 steamers aggregating over 4,370,000 tons called at P. ports. An aerodrome has been estab. at Gaza, for passenger and mails, and there was normally a flying boat service to Cyprus. Under war conditions, the only civil airports were at Lydda, Haifa, and Kallia. There was also an overland and desert mail service with Iraq and Persia. All the prin. tns. are linked up by telegraph and telephone, and there was direct telegraphic communication with Egypt and Syria. The total length of the railways on P. ter. is 336 m. of standard gauge, 274 m. of narrow gauge, and 16 m. which is of mixed gauge. The Hejaz Railway is a 3 ft. 6 in.-gauge railway, and the Kantara-Haifa section is 4 ft. 8½ in.-gauge. There was through communication with Egypt, and trains connected at Kantara W. with Cairo, Alexandria, Port Said, and Suez. E. of Haifa the P. Railways system terminated at El Ilamme. The main junction of the gov. railways was at Lydda. There are over 500 m. of metalled roads which are much used by motor transport.

Population.—The pop. of P. was estimated in 1942 as 1,605,800 (988,000 Muslims, 478,500 Jews, 120,300 Christians, 7000 Druses (*q.v.*), the remainder being Samaritans, Bahais, etc.). These figures are exclusive of Bedouins, who numbered about 100,000. From the 1922 census (752,000) the estimated increase in pop. was over 833,400, the increase among Jews being 390,000, among Muslims 384,000, and among Christians 54,000. Four-fifths of the increase in Jewish pop. was from immigration. The increase in

the Arab pop. was largely due to natural increase resulting from high birth rate and lower infant mortality through improved hygiene. Pop. according to the census of Nov. 8, 1948, in terr. occupied by Israel only, was Jews, 713,000; Arabs and others, 89,000. The estimated pop. of the cap., Jerusalem, on Dec. 31, 1948, was 164,440 (99,320 Jews). The estimated pop. (1946) of the other prin. tns. was: Tel-Aviv, 183,200 (almost all Jews); Haifa, 145,430 (74,230 Jews); Jaffa, 101,580 (30,820 Jews); Gaza, 37,820; Hebron, 26,390; Nablus, 24,660; Lydda, 18,250; Petah-Tiqvah, 18,160 (almost all Jews); Ramle, 16,380; Nazareth, 15,540; Tiberias, 11,810 (8030 Jews); Rehovot, 10,350 (all Jews); and Bethlehem, 9140.

British Mandatory Regime ended.—The General Assembly of the United Nations on Nov. 29, 1947, approved the partition of P. by 33 votes to 13, a decision that was expected since the alternative Arab plan for a unitary state had been decisively rejected by the Assembly's Palestine committee. This was a modified scheme of partition to be implemented by a commission of five members unsupported by any police or military forces. This plan was accepted in principle by the majority of the Jews, but the Arabs announced their intention of resisting it by all means and were promised full support from all the Arab countries, a promise which, in the sequel, proved more or less illusory. While this plan was still being discussed, the Brit. Gov. announced its intention to withdraw all Brit. forces from P. by Aug. 1, 1948, a development which might well have been expected since the gov.'s firm decision to assume no responsibility for imposing by force any plan which was not acceptable both to Jews and Arabs. Such a task indeed would have been difficult, for 84,000 Brit. troops had proved insufficient to maintain law and order, and since the war 338 Brit. subjects had been killed in P. while the Brit. military forces there had cost Britain \$100,000,000. It was obvious that, in the absence of agreement and because of the irreconcilable nature of the interests involved, not only was the mandate unworkable, but also no trusteeship agreement could be made to cover the period until P. achieved independence. The Brit. view was that, in order that their withdrawal might be conducted in an orderly manner and with the least disruption of the ordinary life of the country, it was essential that they should retain control of the country until evacuation was well under way. The mandate would, therefore, be terminated some time in advance of the completion of withdrawal and the date chosen by the gov. was May 15, 1948. When it became evident that the United Nations Commission entrusted with the duty of partitioning P. could not itself arrange for the transfer of the functions exercised by the central gov., steps were taken to hand over these functions as far as possible to the local authorities. Provision was made in the Palestine Bill (Feb. 1948) for ending Brit. responsibilities in P. and in a memor-

andum to the United Nations P. Commission, the Brit. Gov. stated that 'after May 15 the United Nations Commission would be the government of Palestine'—with the somewhat strange addition that 'it did not seem very material whether it was considered to be a *de facto* or *de jure* government' and in any case its title would rest on a resolution of the General Assembly of the United Nations. As might have been expected the country was soon to be the scene of the most violent disorder. At least thirty Brit. soldiers were killed and more injured (Feb. 29) when the Cairo to Haifa train was mined N. of Rehovoth. On March 11 some twelve persons were killed and eighty-nine injured in an explosion which shattered the Jerusalem headquarters of the Jewish Agency. In the debate in the Commons (March 10) on the second reading of the Palestine Bill critics complained that the Bill made no provision for Jewish and Arab states, or for the orderly transfer of power. The gov.'s reply was that the Bill did not impede the creation of these states, which was a matter for the United Nations and not for Britain, and that the orderly transfer of power could not be secured by Act of Parliament.

The New State of Israel.—Some hours before the ending of the Brit. mandate the Jewish National Council in Tel Aviv proclaimed a new state. The National Council was to act as a provisional gov., and Mr. Ben Gurion was appointed Prime Minister. Later President Truman announced the *de facto* recognition of the provisional gov. by the U.S.A., while from Cairo Nokrashy Pasha, the Egyptian Premier, announced that Egyptian armed forces had been ordered to enter P. The General Assembly of the United Nations endorsed an Amer. resolution appointing a mediator for P. between the warring Jews and Arabs. On May 20 the Arab forces sent by the Transjordan Gov. to invade P. reached the Damascus Gate of the old city of Jerusalem, while in the S. Egyptian troops entered Heersheba. It was clear to the United Nations truce commission sent to Jerusalem that the only way to end the fighting in P. was by exerting strong pressure on all the parties concerned. The Arab forces, increasing their attacks on the old city of Jerusalem, broke through a number of Jewish defence lines and the city was isolated from the rest of P. The Security Council of the United Nations then called for a general cease-fire in P. by May 24 and the Jews accepted the proposal. The Arabs refused to comply with the request, but agreed to resume truce discussions in Jerusalem and to study any prompt suggestions by the council for a solution to the P. problem; in short the Arabs played for time, hoping to keep the door open for negotiations. Indeed they had now lost in their struggle to prevent the estab. of a Jewish state, and the fears they expressed when the Jewish national home was first set up under the Brit. mandate were now fully realised and the state of Israel now existed, recognised by the U.S.A., Russia, and sev. other countries.

The Armistice.—When United Nations officers and truce observers arrived in June 1948, there appeared to be a spontaneous desire on the part of almost everybody to help in finding the basis of a peaceful and just settlement. Count Folke Bernadotte, nephew of King Gustav V. of Sweden and a noted Red Cross worker, who was appointed mediator for the United Nations, arrived at Haifa on June 3 and there was a truce soon after his arrival. But the official and public Israeli attitude changed when the Security Council failed to arrive at a solution before the end of the first truce or to extend the latter for a fixed period. However, the truce was maintained up to the earlier days of Oct. and the armies of the Arab states and of Israel were halted and the leaders brought before the supreme tribunal.

The delicate balance between the Israeli wish for immediate settlement of the P. problem and for recognition, on the one hand, and Arab dissension and military weakness on the other, was rudely disturbed by an Egyptian attack on a Jewish convoy in the Negev in Oct. This was used as the signal for the launching of a full-scale campaign by the Jewish forces, with the object of conquering the Negev. With dramatic swiftness the whole Arab position was brought to the verge of collapse. By Nov. the military situation was entirely dominated by the Jewish forces, who could, if they wished, have taken over the whole country. Threatened with encirclement the Egyptian Army evacuated Beersheba and Majdal and fell back southwards. The coastal strip between Tel Aviv to within 10 m. of Gaza was now in Jewish hands. In Galilee sporadic diversionary attacks on Jewish settlements by the Arab national liberation army unleashed a brisk retaliatory offensive by the Israeli forces, and in three days this Arab force practically ceased to exist and its scattered remnants were driven across the Lebanese border. The whole situation in P. proved the necessity for some kind of armed force to carry out the decisions of the United Nations and its officers in the field. The destruction, for example, of the important Latrun pumping station when it was actually under the supervision of those officers, but with insufficient guards to protect it, may well have encouraged the Stern gang to assassinate Count Bernadotte. In Jerusalem the truce was being violated daily because there was no armed force there to safeguard the Holy City. If the small Jewish army now dominated the situation in P. it was due as much to the weakness of the United Nations and the incapacity of the Arabs as to its own undoubted valour and fanaticism, and the arms which were still reaching it.

Before the United Nations Assembly in Paris Moshe Shertok, Israeli foreign minister, now claimed Galilee by right of conquest and the Negev by the terms of the Assembly's own resolution and he rejected the Bernadotte report altogether. This was not the limit of Jewish aspiration, for Mr. Ben Gurion, Israeli Prime Minister, at the same time claimed permanent posses-

sion of modern or Jewish Jerusalem (the new city) and of a corridor connecting it with the main body of Israel, while refusing unconditional Arab rights in the port of Haifa or Lydda airport. The political committee of the General Assembly discussed the Bernadotte report in Paris (Nov. 1948), when Shertok declared that his gov. could not consider the report even as a basis for discussion and contended that the resolution (Nov. 29, 1947) of the United Nations General Assembly for partition was the only valid basis for territorial settlement; and he also asked that Israel be admitted to the United Nations, to put her on an equal footing with the five states, all members of the United Nations, who were waging war upon Israel. The Brit. Gov., however, introduced a resolution calling on the Assembly to accept and take steps to apply the conclusions of the Bernadotte report and recommending that, once the frontiers had been estab., the Security Council should consider any attempt to alter them by force as an act of aggression.

In Dec. King Abdullah announced that he had been invited to unite Arab P. with Transjordan under his rule, and his forces came to agreement with the Israelis. This came as a severe blow to the Arab League. It immobilised the Iraqi Army and paralysed what little initiative remained with the Lebanese and Syrian forces. Egypt was now the sole target of Israeli pressure and on Dec. 22 the Israelis launched what was evidently meant to be the *coup de grâce* and entered Egyptian ter. However, a truce was finally arranged to take effect on Jan. 7, 1949. The Egyptians observed it, but the Israelis were soon on the march again and invaded Egyptian Sinai, where they remained until Jan. 10. On Jan. 13 Egyptian and Israeli representatives met at Rhodes in the presence of Dr. Bunche, the United Nations mediator, to arrange a permanent armistice as a preliminary to peace. The conclusion of this armistice placed before the other Arab states the choice of making similar arrangements or fighting on at a serious disadvantage. Thus, after thirteen months' conflict, the armed Arab struggle to defeat partition in P. had apparently come to an end.

After six weeks of negotiation a general armistice was signed in Rhodes on Feb. 24, 1949. This, the first agreement to have been signed by official Arab and Jewish representatives since the Weizmann-Faisal pact concerning Syria soon after the First World War, was an historic event raising strong hopes of an eventual peace settlement. The armistice pledged each country to refrain from aggressive action against the other and then dealt in detail with the positions which the two forces might take up, Egypt retaining, until the settlement, the Gaza-Rafah coastal area, Beersheba remaining in Israeli hands; but the political rights and claims on both sides were reserved. The armistice did not mean that most Arabs, whether in Egypt or elsewhere, were prepared to recognise Israel, but rather that they

sought a breathing-space. The fact remained, however, that agreement came mainly because neither side wished to go on fighting. If the task of achieving an enduring peace settlement remained, the work of Dr. Bunche or the P. Conciliation Commission to that end was greatly facilitated by the armistice, even though the Israeli Army now controlled half of the Negev from the N. to the gulf of Aqabah, while, assuming agreement were also reached with Transjordan, the other half would probably also be included in the Jewish state. There was every likelihood of agreement between Israel and Transjordan, for the two countries had every confidence in each other's pledges, respected each other's forces, and were natural economic partners. The chances of laying a foundation for good relations between Israel and the Arab world through King Abdullah were enhanced by the fact that the king spoke also for the sister Hashimite state, Iraq. With regard to Jerusalem (q.v.), it would seem to be agreed that a partition plan is the only practical solution.

Arab Refugees Problem.—A serious question for P. is the Arab refugee problem, which is not only a matter of relief, but, as time goes on, one which is further complicated by political considerations. The Israeli Gov. defined its attitude to the refugees in a memorandum to the Beirut conference of Arab States (April 1949), expressing its determination to allow only limited categories of Arabs to return to their homes in Jewish ter. The number of refugees at this time was 700,000, and more continued to swell the total day by day. The original Arab pop. of the new Jewish areas has been estimated at 740,000, of whom perhaps 90,000 have remained. This leaves 650,000 for whom new homes have not yet been found. See also ISRAEL.

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Palestine Exploration Fund, founded in 1865 as a scientific (not religious) society. Its first important work was a complete and accurate survey, both topographical and geological, of the country. Much has been done in excavation, e.g. at Gezer, 1902-9; at Ascalon, 1920-21; Mareshab, 1921; Samaria, 1931-35, etc. The pubs. of the society include the *Excavations at Jerusalem*, 1894-97; *Hygiene and Diseases in Palestine in Modern and Biblical Times*; *Early Heights and Measures*; *The Latin Kingdom of Jerusalem*; *Samaria-Sebastia* (3 vols.); maps, plans, models, casts, photographs, and slides. A quarterly jour. is also pub. There are many branch associations in the colonies, U.S.A., and Palestine.

Palestine, Operations in First World War. Owing to the evacuation of Gallipoli and the surrender of the Brit. force under Gen. Townshend at Kut (q.v.), Brit. prestige in the Near E. had declined. But the success of the O. in P. in 1917 was a material factor in restoring confidence. Brit. troops under Sir Archibald Murray began the offensive by advancing from N. Egypt and driving the Turks before them over the Sinai Desert. A halt then ensued in order to give time for the construction of a military railway from Kantara to Rafa on the S.W. border of P., from which the advance was resumed northward along the coast. But at this point the advancing force was held up by the Turkish resistance at Gaza, the chief battle for the tn. being on March 26, 1917. This check, however, marked the limit of Turkish success; Gen. Murray was replaced by Gen. (later F.M.) Allenby (q.v.), who had greatly distinguished himself on the W. front. Gen. Allenby at once proceeded to re-equip his forces and to reorganise them

for a determined effort. The offensive was resumed in Oct., the moment being favourable because a considerable Turkish force was occupied, E. of the Dead Sea, against the Arabs of the Hedjaz. Allenby took Beersheba in a surprise attack and then fought the second battle of Gaza on Dec. 6, the tn. falling on the following day. This success heralded the beginning of his victorious advance through P., for Jerusalem was captured after the battles fought Dec. 7-9, 1917, three weeks after the Brit. had taken Jaffa, the latter tn. falling after the cutting of the Jaffa-Jerusalem railway at Ludd. Jerusalem was encircled from nearly all quarters, all the Turkish outer positions being taken by storm, and the city itself was surrendered without standing a siege. The following year Jericho was taken in the fighting of Feb. 19-21, and thereafter followed a long halt in the operations, the Brit. hold on the country being in the meantime consolidated. The culminating battle in the P. operations was that of Megiddo (Sept. 19-25, 1918), which followed a brilliant outflanking operation by the cavalry under Sir Philip Chetwode. Allenby's P. campaign is a tale of almost uninterrupted success and of efficient management, and much of the success was due to his magnetic personality. He was especially successful in welding together the very various components of his force, regulars, yeomanry, and New Army, the mounted troops of Australasia, and the Indian contingent, a great part of which contained elements previously untested in war. The Arab effort, too, under T. E. Lawrence (q.v.), was of considerable value, and it was not the least of Allenby's achievements that he should have made the best of such difficult allies. On the broader question of the value of the campaign, a prolific source of contention between the 'E.' and 'W.' schools of military thought, it may be asserted that the P. operations could never have been a decisive factor in the issue of the war. But they were valuable in diverting the strength of the Turks, and to some extent even of the Gers., from more vulnerable points of the allied fronts, and still more in their moral effect, an effect which would have been evident much sooner but for the fact that the military exigencies on the W. front deprived Allenby of many of his best troops. The campaign has a special interest in the brilliant and, no doubt, spectacular work of the cavalry, an effort which marked the last great campaign of mounted troops in modern warfare. See T. E. Lawrence, *Revolt in the Desert*, 1927, and Sir G. McMunn and C. Falls, *Military Operations, Egypt and Palestine, 1917-1918*, 1928.

Palestrina, Giovanni Pierluigi da (1526-1594), It. musical composer, b. in the tn. of Palestrina (whence his name), but who passed his life almost entirely at Rome, where in 1540-41 he studied with Firmin Le Bel. In 1551 he was appointed choir-master at the Vatican, with which his name was associated until his death, except for a period of sixteen years (from

1555) when he was engaged at other Rom. churches, e.g. the Lateran and Santa Maria Maggiore. His works, which are pub. in thirty-three vols. by Breitkopf, consist almost wholly of church music—over 80 masses, 250 motets (out of 500, pub. originally in seven books, 1563-84), and numbers of hymns, magnificates, litanies, etc. P. represents the finest achievements of his period in the domain of polyphonic writing. His music is strongly devotional in spirit. See lives by E. Schmitz, 1914; K. G. Fellerer, 1930; and H. Coates (Master Musicians), 1938.

Palestrina, or **Præneste**, tn. in the prov. of Rome, Italy. It occupies the site of the anct. city of Præneste, and is situated on a spur of the Apennines 1476 ft. above sea level, and commanding a magnificent view of the Alban Hills, Rome, and Soraceto. In 499 B.C. the city made an alliance with Rome, separating from the Lat. League to which it had previously belonged, but during the Lat. war (340-338) it fought against Rome and lost part of its ter. Down to the time of the Social war it remained an allied city, and it then received the Rom. franchise (about 90 B.C.). During the civil wars of Sulla the tn. was blockaded, and after it fell a military colony settled there. Sulla removed the city from the hillside to the lower ground at Madonna dell' Aquila and enlarged the famous temple of Fortune on the site of the anct. city, making it the largest in all Italy. It was built on five terraces, and contained the famous mosaic with scenes from the Nile now in the Palazzo Barberini. It was also famed for its oracle, which was consulted down to the time of Constantine, who had the temple closed. The city became a favourite resort of the Romans, and Hadrian and Marcus Aurelius had villas there. In 1297 the Colonna family owned the city, and during a revolt against the pope it was taken and destroyed. It was rebuilt, but in 1437 the new city shared the same fate. Stefano Colonna rebuilt it in 1418 and fortified it, and it remained in the possession of the family until purchased by the Barberini family in 1630. Only a few ruins of the anct. city remain; but excavations have brought many interesting relics to light, among them an anct. calendar which had been used in the rebuilding, and the famous Florentine casket found in 1738 and preserved in the Kircherian Museum in Rome. Here was found the earliest Lat. inscription. In the fighting of 1814 the temple of Fortuna was damaged, the capital of one column being broken and the cornice displaced. The Nile mosaic in the Barberini Palace was removed to Rome. The tombs were unharmed but the cathedral was wrecked internally. Pop. 9100.

Pale, The, or **The English Pale**, name applied to that part of Ireland in which Eng. law was acknowledged. The dominion of England was for some centuries after the conquest of Ireland by Henry II. restricted to the P. the boundaries of which varied, but which included Kildare, Louth, Meath, and Dublin. The P. as an entity disappeared when Ireland was com-

pletely occupied in Elizabethan times. See E. Curtis, *A History of Ireland*, 1936.

Paley, William (1743-1805), Eng. divine, b. at Peterborough; was educated at Christ's College, Cambridge, and was senior wrangler in 1763. He entered the Church, and, after holding sev. livings, was appointed prebendary (1780) and then archdeacon (1782) of Carlisle. He pub. *The Principles of Moral and Political Philosophy* (1785); *Horæ Paulinæ* (1790); *A View of the Evidences of Christianity* (1794); and many other works. The *Evidences of Christianity* brought him into great prominence as a theological writer and was long accepted as a standard work. See life by G. W. Meadley, 1809; also L. Wainwright, *A Vindication of Dr. Paley's Theory of Morals*, 1830.

Palghat, tn. in the dist. of Malabar, Madras, India, situated at the P. Pass on the Nilgiri Hills. Among its educational buildings is the Victoria Jubilee College. Pop. 55,100.

Palgrave, Sir Francis (1788-1861), Brit. historian, b. in London of Jewish parentage, but was converted to Christianity in 1823. Called to the Bar in 1827, from 1838 till his death he was deputy keeper of the records, in which capacity he arranged a great mass of hitherto inaccessible documents and ed. many of them for the Record Commission. Among the most important of these are *Parliamentary Writs* (1827-31). Among his works are *History of England* (only vol. i. pub.), *Anglo-Saxon Period* (1831); *The Rise and Progress of the British Commonwealth* (1832); *The History of Normandy and of England* (4 vols., 1851-64). His works are of great value in throwing light upon the hist. and condition of medieval England.

Palgrave, Francis Turner (1824-97), Eng. poet, b. at Great Yarmouth, Norfolk, son of Sir Francis P., the historian, was, in 1846, private secretary to Gladstone, and two years later entered the Education Office, in which he rose to be assistant-secretary. He retired from the service at the age of sixty. He was prof. of poetry at Oxford from 1885 until 1895. He was the author of many vols. of poetry and essays, but he is best remembered for his anthology, *The Golden Treasury of Songs and Lyrics* (1861). This is still regarded as one of the best, if not the best, of the works of this kind, and to its compilation P. brought a wide knowledge of literature and a fine judgment. See life by G. F. Palgrave, 1899.

Palgrave, Sir Robert Harry Inglis (1827-1918), Eng. economist, b. at Westminster, son of Sir Francis P. He ed. the *Economist* newspaper 1877-83, was knighted 1909, and received the hon. freedom of Great Yarmouth 1910. His pub. include *The Local Taxation of Great Britain and Ireland* (1871); *Notes on Banking* (1873); *Analysis of the Transactions of the Bank of England, 1844-73* (1874); and *Enquiry into the Economic Condition of the Country* (1904). He ed. the *Dictionary of Political Economy* (1894-1906)—Appendix (1908).

Pali, tn. of Jodhpur, India, 40 m. S.S.E. of Jodhpur, is a trade centre. It is on the railway between Jodhpur and Marwar.

Pali. The term P. means actually the 'text,' the text *par excellence*, the text of the Hinayāna Buddhist scriptures, but it indicates also the language in which the sacred scriptures of Buddhism are recorded, and the script in which these are written. The P. Scriptures contain a literature about double the size of the Bible, but if its repetitions were excised it would be somewhat smaller than the Bible. It consists of three Pitakas (called also Tripiṭaka), baskets, or collections. They are supposed to be the teachings of Buddha, which were being handed down orally; they were committed to writing probably at the end of the first century B.C. (traditionally in 80 B.C.). The first Pitaka is the Vinaya, dealing with discipline, but including the Mahavagga, a hist. of the founding of the order of Buddhism, and the exposition of monastic rules. The second is the Sutta (Sūtra) Pitaka, or collection of teachings. It consists mainly of dialogues between the Buddha and various interlocutors, and it contains books of meditation and devotion, sayings by the Master, poems, fairy tales, and fables, stories about Buddhist saints, and so on. The third collection, the Abhidhamma, or dogmatic statement of the psychological and philosophic discriminations, contains speculations and discussions on various subjects. There are some other treatises in the P. literature. The most important historical work written in this language is the *Mahāvaṃsa*; other P. works are the *Dhammapadam* and the *Sutta-nipata*, lofty and artistic ethical and religious verse; the highly literary Jātaka book of 547 stories of Buddha's prior incarnations in various animal and human forms; the beautiful poetic compositions of the *Thera-gāthā* and *Theri-gāthā*, or 'Songs of the Monks' and 'Songs of the Nuns'; the *Mūlinda-pāṇha*, or dialogues of the Buddhist monk Nāgasena with the (Gk. king Menander, etc.

The language P. should be termed *pāṭiśāsā* or *śāntibhāṣā* rather than P. It is an anc. Prakrit, i.e. a 'natural uncultivated' local Middle Indian dialect, probably originated in N.W. India. The great Gautama Saṃyamaṇi Buddha (see BUDDHA), anxious to make his spiritual teachings accessible to the common people, refused to confine them to Sanskrit (q.v.), the language of the small privileged class. His teachings became, thus, a potent cause of the development of the language of the people. It is uncertain, however, which of the local dialects became the P. language. According to some scholars it was a prototype of Māgadhī, according to others it should be traced to anc. W. Hindi. It is also uncertain whether the oldest works of Buddhism were actually written in what is now known as P. P. is nowadays used in Ceylon, S. A., and Burma as liturgical language of Buddhism, although it had to give way before the native tongues, in which the later Buddhist literature was composed.

The P. script developed from the archaic Brāhmī, and in the last centuries B.C.

became the writing of the Buddhist scriptures; it was carried by the Buddhists to Ceylon, where it gave rise to the early Sinhalese writing. The cultural expansion of India into Burma, Cambodia, Cochin China, and Siam was also mainly due to Buddhism. The scripts of the Buddhist monks became the vehicle of their culture and their outward organisation: Buddhism played in S.E. Asia a part similar to that of Rom. Christianity in W. and Central Europe in the Middle Ages. P. Buddhism, i.e. the particular form of Buddhism based on the sacred P. books, was brought over from Ceylon in the eleventh-twelfth century A.D. In Burma, the 'square' P. script developed into a capricious, highly calligraphic character, generally employed for writing the religious Buddhist books. The letters are painted with a broad brush (generally in dark brown lacquer, and sometimes on a plate of gilded metal) and are correspondingly very thick. The Buddhist Burmese script was adopted by various peoples (the Karons, the Tangthas, the Yaks, and others), but the Siamese and the various Shan scripts, the Javanese, and other Indonesian scripts, and so forth, which are still considered by some scholars as belonging to the P. branch, may be better termed the Further-Indian branch of scripts, because they do not descend from the P. script, but from another script of Indian origin.

Palikao, Comtede, see COUSIN-MONTAUBAN.

Palilicium, see ALDEBARAN.

Palimpsest (παλιψηστός, scraped again), name given to a MS. on parchment, from which the original writing has been erased or washed out, and another text written over it. This practice was due to the scarcity and high cost of parchment, and is mentioned by Cicero. *Ad Fam.* vii., Plutarch, and other classical writers. It was most common between the seventh and ninth centuries, but continued even down to the sixteenth. The old writing was scraped off with a razor or with pumice, and a mixture of cheese, milk, and lime was used to soften the vellum. However, the ink of the old writing had penetrated so deeply into the parchment that even most severe scraping could not remove all traces of the text. If the MS. is soaked in certain chemicals, the blue or red outlines of the old writing come again to the surface. Unfortunately after this treatment—primarily acid obtained from oak gall was used for restoring the P.—the MS. becomes so dim that it is impossible to read it. More recently, in place of tannic acid, other substances have been used, which bring out the old writing for a short time. While the text is thus visible, photographs are taken, and then the acids are washed out. Nowadays photographs of the old writing can be taken without any chemical treatment, only by using ultra-violet rays or fluorescence. Many valuable MSS., which were lost, have thus been restored. There are even Ps. in which there appear three successive writings. Sometimes the Ps. are bilingual, the old writing being Gk.

and the new writing being Lat., or Syriac and Arabic, or Heb. and Lat., and so forth. Many Ps. are written in capitals or uncials, in Gk. or Lat. A Sinaitic Syriac P. turned out to be one of the earliest trans. of the N.T. The idea of using P. MSS. for the discovery of fragments of lost works was first taken up about the eighteenth century. Dr. Bruno ed. his fragments of Livy (1773), Niebuhr's ed. appeared in 1820. Cicero's *Republic* and the *Institutiones* of Gaius were thus recovered. Mal pub. the *Codex Ambrosianus* of Plautus, 1814-15. Tischendorf discovered biblical P., including the *Codex Ephraemi*, 1843-45. See E. Chateelain, *Les Palimpsestes latins*, 1907.

Palindrome (Gk. *παλιν*, again, and *δρομος*, a course) is a form of verse found in Lat. which reads the same either backwards or forwards, e.g. 'Roma tibi subito motibus ibit amor.' An example in Eng. is, 'Able was I ere I saw Elba,' supposed to have been said by Napoleon when asked whether he could have invaded England; and in Gk., *Νίψον ἀνομήματα μη μόνον ἄνθρωπον* ('Wash my sin, and not my face only'), frequently inscribed on Eng. fonts, e.g. St. Mary's, Nottingham, is famous. 'Dog a devil defiled, defiled lived a god' is supposed to be the longest P. in Eng. The 'Sator-Arepe formula':

SATOR
AREPE
TENET
OPERA
ROTAS

is, besides being a P., a quadrate, i.e. it can be read as a square. This magician's formula can be traced back to the fourth century A.D. and appears to have originated in Asia Minor. The term is freely used at any rate by acrosticists, etc., for a single word like 'ere.'

Palinurus (παλινούρος), in classical legend, pilot or helmsman of Aeneas, who was drowned off the W. coast of Italy (Lucania) during the voyage from Troy, having fallen overboard while asleep. Palinuro Punta (or Spartimento, above the gulf of Policastro) was called after him. See Virgil, *Aen.*, vi., 337; Strabo, vi.

Palisander Wood, see ROSEWOOD.

Palissy, Bernard (c. 1510-89), Fr. potter and enameller, b. near Agen. For years he laboured in the direst poverty to discover how to make fine enamels, having chanced to see a beautiful enamel cup (c. 1541). By 1557 his work won recognition, and he had succeeded in producing the distinctive ware called by his name, pottery decorated in high relief with rustic figurines (plants, fruits, shells, fishes, etc.), in colours true to nature. The Comte de Montmorency became his patron and employed him on the Château d'Ecouen. Though a Huguenot, P. was protected by the king and nobles. He was exempted by Catherine de' Medici from the massacre of St. Bartholomew, and gave courses of lectures on natural hist. and physics (1575). He was imprisoned in the Bastille (c. 1588), and died there. Anatole France pub. his *Oeuvres complètes* (1880). See lives by

H. Morley, 1852; A. B. Henschmann, 1903; and D. Leroux, 1928.

Palitana, state and tn. of Kathiawar peninsula, Bombay, India, 73 m. N.E. of Diu. The Satrunjaya Hill above the city (W.) is the most sacred of the hills of the Jains (c. 1977 ft.). It is covered with temples and shrines, some dating from the eleventh century. The larger ones are in 'taks' or separate enclosures. Horse-breeding is largely carried on. Pop. 76,000; (tn.) 16,700. See J. Hurgess, *Notes of a Visit to Satrunjaya Hill*, 1869.

Pallurus, genus of deciduous flowering shrubs (family Rhamnaceae), with slender branches bearing spiny stipules and clusters of small green and yellow flowers, followed by dry, hemispherical fruits. *P. australis* (Jew's thorn), which is hardy in Britain, is a native of S. Europe and W. Asia, and is believed to be the plant from which the crown of thorns was made.

Palk's Bay and Strait, gulf and channel of the Indian Ocean, between India and N. Ceylon, N. of the shoals called 'Adam's Bridge.' The Dutch named it after Governor Palk. At the narrowest part it measures 40 m. across.

Pall, see PALLKUM

Palladian, see PALLADIO, ANDREA.

Palladio, Andrea (1518-80), It. architect, b. at Vicenza. He studied in his native city and at Rome, and assisted in the building of St. Peter's, under Paul III. He was one of the greatest It. architects of the late Renaissance, and the style which he used has received the name of Palladian. It was an attempt to revive the severity and dignity of the Rom. architecture, and was learnt from Vitruvius and from a study of the Rom. monuments that remained. Its best exponent in England was Inigo Jones. P. greatly influenced the architecture of his day by his work, *I quattro libri dell' Architettura* (1570), which was immediately trans. into most European languages. See C. Gurlitt, *Geschichte der Barockstile in Italien*, 1887, and *Geschichte der Kunst*, 1902; and Sir B. Fletcher, *A. Palladio: His Life and Works*, 1902.

Palladium (Gk. παλλάδιον), in classical legend, an image of Pallas (usually identified with Athene), upon the preservation of which in its sanctuary the safety and welfare of the state depended. The most famous was the auct. wooden image (εἰκαστον) supposed to have fallen from heaven as a gift from Zeus to the founder of Ilium, and guarded in the citadel of Troy. Odysseus and Diomedes stole it during the Trojan war, thus procuring victory for the Gks. Different versions of the story represented the P. as carried to Greece, or brought by Aeneas to Italy and kept in Vesta's temple at Rome. In general use P. has come to mean a 'protecting institution,' or that which assures possession.

Palladium, chemical element, symbol Pd, atomic number 46, atomic weight 106.7; one of the 'platinum metals' found in the platinum ore which occurs in small grains and rare nuggets in alluvial deposits and riv. sand principally in Brazil, California, and the Urala. It is a lustrous white metal (melting-point about 1500° C.

and sp. gr. 11.8) which is not acted on by the air at ordinary temps. P. forms the exception in the platinum group of metals by dissolving in hot nitric acid. The oxides Pd₂O, PdO, and PdO₂ are known, and the metal forms palladous salts corresponding to the monoxide as well as a palladic chloride, PdCl₄. The metal has the special property of occluding large volumes of hydrogen to form a substance of metallic appearance which is not a true compound, though it approximates to the composition Pd.H. Absorption takes place most rapidly at 100° C., and with finely divided metal, about 900 volumes of hydrogen being absorbed by 1 volume of metal. P. is used in dentistry, jewellery, scientific instruments, aeroplanes, etc.

Palladius, Rutilius Taurus Aemilianus, Rom. author of the fourth century A.D., who lived about the time of Valentinian or Theodosius. His *De re rustica* was mainly compiled from Columella and earlier writers. A Middle English verse trans. from an Eng. M.S. (c. 1420) was pub. for the Early English Text Society under the title, *Palladius on Husbandrie*. See Schmitt's Ger. ed., 1898, and J. G. Schneider, *Scriptores Rei Rusticae*, iii., 1795.

Pallanza, tn. and winter resort in the prov. of Novara, Italy, on an arm of Lake Maggiore, opposite the Borromean Is. It commands a fine view of the Alps. Silk and cotton are manufactured. Pop. 5300.

Pallas, Peter Simon (1741-1811), Ger. traveller and naturalist, b. at Berlin. He studied medicine and natural hist. at the univs. of Berlin, Göttingen, and Leyden. In 1766 P. pub. *Elenchus Zoophytorum et Miscellanea Zoologica*. With these works he gained high reputation, and in 1768 he was appointed naturalist to a scientific expedition bound for Siberia, there to observe the transit of Venus. P. returned to St. Petersburg in 1774 with extraordinary specimens in natural hist., which formed the nucleus of the museum of the Academy of St. Petersburg. His other works include *Russen durch verschiedene Provinzen des russischen Reichs* (3 vols., 1771-76; supplement, 1779-1801); *Sammlungen historischer Nachrichten über die mongolischen Völkerschaften* (2 vols., 1776-1802); *Flora Rossica*; and *Icones insularum, praesertim Rossiae Siberiaeque peculiarium* (1781-1806).

Pallas, one of the planetoids or asteroids, second in order of discovery (Ceres being the first) and furthest from the sun, revolving between the orbits of Mars and Jupiter. It was discovered by Olbers at Bremen (1802). Its magnitude remains uncertain, while its period of revolution has been reckoned at about 1.61 years.

Pallas, hamlet of Longford co., Ire. 2 m. S.E. of Ballymahon. Oliver Goldsmith was b. here (1728).

Pallas: 1. Appellation of the Gk. goddess Athene or Athena (q.v.), perhaps derived from παλας, virgin. 2. Favourite freedman of the Emperor Claudius (c. 10 B.C.-A.D. 63). P. and Narcissus together administered the affairs of the

empire under Claudius. Urged by P. Claudius married Agrippina (A.D. 49) and agreed to adopt her son, i. D. Ahenobarbus (later the emperor Nero), by a former husband, as his successor. P. then became Agrippina's accomplice in poisoning Claudius (54), but was dismissed from office by Nero (56), who had him poisoned. See Suetonius, *Claudius*; Tacitus, *Annales*, xi. 29, xii. 2, 25, 65, xiii. 23; Juv. i. 107.

Pallavicino, Pietro Sforza (1607-67), It. historian and cardinal, son of Alessandro P. of Parma, b. at Rome. P. took priest's orders and held important eccles. appointments during the pontificate of Urban VIII. He entered the Society of Jesus in 1637, and was created cardinal by Pope Alexander VII. in 1657. P. was the author of many fine works, but the best known is his *Istoria del Concilio de Trento* (1656-57), intended as a reply to the still more celebrated work of Paul Sarpi. His collected works were pub. 1814-18.

Pallio, La, see ROCHELLE, La.

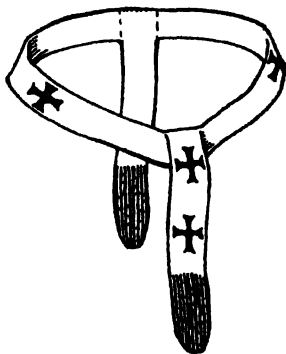
Palliser, Sir Hugh (1723-96), Eng. admiral, son of Hugh P., an army officer, b. in Yorkshire. In 1759, in his ship *Shrewsbury*, in which he had fought under Anson off Ushant and captured many prizes, he took part in the operations in the St. Lawrence leading up to the capture of Quebec. In 1764 he was governor and commander-in-chief of Newfoundland. In 1778 he was promoted to be vice-admiral of the blue. After the action off Ushant in July 1778, in which the Fr. fleet escaped, a court-martial on Keppel, P.'s superior officer, pronounced the charges malicious and ill-founded. P., whose supporters, or adversaries of Keppel, had instigated the inquiry, consequently resigned and applied for a court-martial on himself, the result being that he was censured for his conduct in the action. It seems probable that a fair and independent court would have reached a very different conclusion. P. was a brave and capable officer, though his conduct in the action remains a mystery, the more difficult to solve because his character was differently estimated by the factions of the day. In the year after the court martial he was appointed governor of Greenwich Hospital and became an admiral in 1787. See Southey's *Life of Nelson*, 1813.

Palliser, John (1817-87), Canadian geographer and explorer, b. in Ireland, brother of Sir Wm. P. (q.v.). He travelled over N. America in the then uncharted regions of the far W., between 1847 and 1861. He made a topographical delimitation of the boundary between Canada and the U.S.A. from Lake Superior to the Pacific coast.

Palliser, Sir William (1830-82), Brit. soldier b. in Dublin, entered the army as a cavalry officer. He invented the method of drilled shot that bears his name and the method of converting smooth bore into rifled guns (1862-63).

Pallium, or **Pall**, vestment worn by the pope and by archbishops about the neck, breast, and shoulders. It consists of a narrow circular strip of cloth, about 2 in.

wide, with two pendants about 12 in. in length, which hang down, one over the breast, the other at the back of the wearer. These strips are weighted with small pieces of lead enclosed in black silk. The rest of the P. is made of white wool, wholly or in part taken from two lambs provided by the Lateran Canons of St. John and blessed by the pope on the feast of St. Agnes. The pope may wear the P. on all occasions, but the times of its use by archbishops are strictly regulated. The P. is granted only by the pope, and each newly consecrated metropolitan must apply to him for



PALLIUM

it within a year after consecration. The P. symbolises the supreme pastoral power. It is known to have been in use at least from the fifth century.

'**Pall Mall Gazette**,' penny daily evening newspaper founded in 1865 partly to supply the want of an evening paper in the journalism of the day, and partly to adapt the principle of the review to the current newspaper press. The first proprietor was Thackeray's publisher, and the editor was Thackeray's assistant in the conduct of the *Cornhill Magazine*, facts which, taken with the earlier style of the paper, have often suggested that it was pub. upon the lines of Thackeray's jour. (also called the *P. M. G.*), written 'by gentlemen for gentlemen.' It was an almost instant success, the more especially because in politics it took up an independent line, a policy that it pursued down to 1880, when it became, under John Morley's (later Lord) editorship, a Radical paper. It was for long as strongly Conservative as before it was Radical. It came to an end in 1923, being incorporated in the *Evening Standard*.

Pall-mail, Pell-mell of Mell, see MALL, THE.

Palm (Gk. *πάλμης*; Lat. *palma*), measure of length, corresponding either to the breadth of the palm of the hand (3-4 in.) or to the whole length of the hand from wrist to finger-tips (7-9 in., Rom. measure 8 in.).

Palma di Cesnola, Count Luigi, see CESNOLA.

Palma Giovine ('The Younger': **Jacopo (Giacomo)**) (c. 1544-1628), It. painter. He was the grand-nephew of 'Il Vecchio.' He imitated Titian, Tintoretto, and Paolo Veronese, and studied the antique at Rome (1569-67). He is held by some to combine the best features of the Rom. and Venetian schools. The architect A. Vittorino became his patron and obtained innumerable commissions for him. Among his works are 'St. Catherine rescued from the Wheel,' 'Madonna with Saints,' 'The Brazen Serpent,' 'Resurrection of Lazarus.' See C. A. Rosenberg, *Kunst und Künstler Italiens*, vol. III., 1879; G. Morelli, *Italian Masters in the German Galleries*, 1883; and P. Locatelli, *Notizie intorno a G. Palma*, 1890.

Palma Vecchio ('The Elder': **Jacopo (Giacomo) d'Antonio de Negreti**) (c. 1480-c.1528), It. painter of the Venetian school, b. at Serinalta, near Bergamo. He studied under Bellini and others. He was much influenced by Giorgione, Titian, Cima, and Carpaccio, but employed harder colour. Among his best works were 'Santa Barbara' (Venice); 'A Holy Conversation' (Naples and St. Petersburg); 'St. Jerome,' 'The Virgin Enthroned' (Vicenza); 'Adoration of the Magi,' and various portraits. See J. A. Crowe and G. B. Cavalcaselle, *History of Painting in North Italy*, 1871; M. von Boehn, *Giorgione und Palma Vecchio*, 1908; G. Vasari, *Lives of the most eminent painters, sculptors, and architects*, 1912 13; and life by A. Spahn, 1932.

Palma: 1. Fort. tn. on the S.W. coast of Majorca Is., Spain, cap. of the Balearic Is., 130 m. S.E. of Barcelona. The bay of P. has a fine harbour, and new docks were completed there in 1910. P. contains a fourteenth-century cathedral (completed in 1610) generally regarded as one of the six finest Gothic edifices in the world, a fifteenth-century Gothic bourse, a sixteenth-century tn. hall, and other fine buildings. It has a trade in fruits (oranges and almonds), silk, liqueurs, and chocolate are manufactured. The thirteenth-century castle of Jaymo, king of Aragon and Majorca, is 2½ m. S.W. Pop. 136,000. See R. A. Cram, *The Cathedral of Palma de Mallorca*, 1932. 2. La P., tn. of Huelva prov., Spain, 24 m. E.N.E. of Huelva. Pop. 8000.

Palma di Montechiaro, tn. in the prov. of Girgenti, Sicily. Its chief exports are fruit, sulphur, and soda, and it is noted for its almonds. Pop. 18,200.

Palma (San Miguel de la Palma), one of the Sp. group of Canary Is., Atlantic Ocean, 15 m. W.N.W. of Tenerife. It is mountainous with deep gorges, Pico de la Cruz rising to about 7440 ft. Wine, fruits, honey, sugar, wax, and silk are produced. The chief tn. is Santa Cruz on the E. coast. With Tenerife, Gomera, and Hierro, it has formed since 1927, the Sp. prov. of Santa Cruz de Tenerife. Pop. 60,500.

Palmas, Cape, headland of Liberia, W. Africa. There is an Amer. mission station here.

Palmas, Las, see LAS PALMAS.
Palma Beach, vil. of Florida, U.S.A.,

situated on a narrow piece of land between Lake Worth and the Atlantic Ocean, 65 m. N. of Miami. It is a fashionable resort. Its nearest railway station is W. P. B., on the opposite side of Lake Worth and connected with it by a bridge and ferry. P. B. and W. P. B. are fashionable winter resorts. W. P. B. has a deep harbour and is a port of call and trading centre for the local fisheries, and timber products. Pop. (P. B.) 3700; (W. P. B.) 33,600.

Palmer, John (1742-1818), projector of mail-coaches in England and proprietor of the Bath theatre from about 1776, b. at Bath. He suggested to Pitt in 1782 his scheme for running mail-coaches, and the first started from Bristol in 1784. The idea was promptly caught up, and service multiplied rapidly throughout the country. P. became comptroller-general of the post office in 1786, but was dismissed (c. 1792) because of his frequent quarrels with Lord Walsingham, the postmaster-general. He was granted £50,000 as compensation in 1813. See H. S. Penley, *Bath Stage*, 1892, and H. Joyce, *History of the Post Offices to 1830*, 1893.

Palmer, Sir Roundell, see SELBORNE, EARL OF.

Palmer, Samuel (1805-81), Eng. landscape painter and etcher, son of a small bookseller at Newington, Surrey. He was sent to the Merchant Taylors' School; he discovered his powers there, and as early as 1819 showed three pictures at the Royal Academy, a remarkable record for a boy of fourteen. At this same exhibition he was deeply impressed by Turner's 'Orange Merchantman.' He became a member of the Etching Club in 1833. Many of his best pictures are on subjects from Milton. There is a trans. of Virgil's *Eclipses* by him, pub. after his death, which took place at Reigate. The plates in this work were designed and, in part, executed by himself. His best works show a genuine, if limited, imagination, and express a personal and emotional vision of nature. See G. Grigson, *Samuel Palmer: the Visionary Years*, 1947.

Palmer, William Waldegrave, see SELBORNE, EARL OF.

Palmer, tn. of Hampden co., Massachusetts, U.S.A., on the Chicopee R. It manufs. straw goods. Pop. 8100.

Palmer (medieval Lat. *palmarius*, from *palma*, a palm), one who, having made a pilgrimage to the Holy Land, was now returning therefrom, carrying a palm-leaf as a sign of his accomplished journey. The title was later applied to those itinerant religious men who spent their whole time in such pilgrimages subsisting on charity. It is also frequently used merely as an equivalent to 'pilgrim.'

Palmerston, Henry John Temple, third Viscount (1761-1845), Eng. statesman, b. at Broadlands, near Romsey, Hampshire; succeeded in 1802 to the Irish peerage, and five years later entered the House of Commons. Within twelve months he became lord of the admiralty under the duke of Portland, and in 1809 accepted the secretaryship of war, which, under

various Prime Ministers, he held until 1828. He became foreign minister under Grey (1830), and remained in that office (except during Peel's brief administration) until 1841. In this great position he maintained and even increased the great prestige of England, which was never higher in the nineteenth century than when he was at the Foreign Office. In opposition until 1846, in that year he became foreign secretary under Russell, and in 1850 made his famous *civis Romanus* speech, in which he estab. his reputation as an orator and won the hearts of his countrymen. It was in that year that Queen Victoria, exasperated by P.'s highly independent methods of organising foreign policy, sent him a memorandum through her Prime Minister. This memorandum declared that the queen 'requires, first, that Lord Palmerston will distinctly state what he proposes in a given case, in order that the queen may know as distinctly to what she is giving her royal sanction; secondly, having once given her sanction to a measure, that it be not arbitrarily altered or modified by the minister. Such an act she must consider as falling in sincerity towards the Crown, and justly to be visited by the exercise of her constitutional right of dismissing that minister.' The queen was in the right, from a strictly constitutional view, but the future was to confirm the practical withdrawal of the Crown from direct control of policy. The memorandum had little effect on P. When in 1851 he expressed his approval of Napoleon's *coup d'état*, without having consulted the queen or his colleagues, he was, at the demand of her majesty, dismissed from office by Lord John Russell. Shortly after he had his 'tit-for-tat with Johnnie' (as he expressed it), and overthrew the gov. He became home secretary under Aberdeen in 1852, and strongly advocated a firm attitude against Russia. The Crimean war broke out in 1854, mismanagement was rampant, and Aberdeen (q.v.) resigned in the following year. Almost by general consent, P. became Prime Minister, and his vigorous action soon brought about a more satisfactory condition of affairs. He was defeated in 1857 on the China war question, whereupon he dissolved Parliament and appealed to the nation, and was promptly returned to power. He was defeated again the following year on the Conspiracy to Murder Bill, when it was thought that he, of all men, had trucked to a foreign power. In the meantime, however, he had suppressed the Indian mutiny, 1857-58. In 1859 he again formed a gov., and so strongly was he supported that it was said that he was 'Prime Minister for life,' his following being almost entirely personal. Gladstone was chancellor of the exchequer in this administration, but he and his chief could not see eye to eye, and once P. was moved to write to the queen that it would be 'better to lose Mr. Gladstone than to run the risk of losing Portsmouth.' In this, his second administration, he furthered the cause of free trade, but made the mistake of allowing the *Alabama* (q.v.) to leave Birkenhead.

Though like many of the leading statesmen of the period (1837-70) P. gave no sustained attention to the overseas empire, believing that the colonies would eventually become independent, he was no separatist. He showed, both in 1856 and in 1861, that he had not the slightest intention of allowing Brit. N. America to be seized by the U.S.A. He died in office on Oct. 18, 1865, in his eighty-first year, and was buried near Pitt in Westminster Abbey. P. was an ideal Eng. minister, firm, tactful, humorous, and blessed with great common sense that enabled him to extricate the country and himself from awkward places. He was the most popular Prime Minister of the day, and, except in connection with the Conspiracy to Murder Bill, could always rely upon being supported. In character and policy he expressed the self-confidence of the ruling classes of his era. Though often taking a high-handed attitude towards the powers of Europe, his foreign policy was based on sound principles, and he was able to carry out his plans without resort to force. Only towards the close of his career did he find himself checked (by Bismarck, the organiser of Prussian power). See A. E. M. Ashley, *The Life and Correspondence of Henry John Temple, Viscount Palmerston*, 1879; P. Guedalla (ed.), *The Palmerston Papers: Gladstone and Palmerston*, 1928; and H. C. F. Bell, *Lord Palmerston*, 1936.

Palmerston, Australia, see DARWIN, PORT.

Palmerston North, city in Manawatu dist., Wellington Prov., N. Island, New Zealand, 87 m. N. of Wellington. The centre of a thriving dairy and sheep-raising country, it was proclaimed a city in Aug. 1930. There is an agric. college. Pop. of bor. and surrounding area, 30,100.

Palmerton, tn. of Carbon co., Pennsylvania, U.S.A., on the Lehigh R. It is the commercial centre of a farming dist. and also has zinc and silk factories. Pop. 7400.

Palmetto Leaves, leaves of *Sabal palmetto*, a fan palm, native of Central America, which are used in making hats and mats.

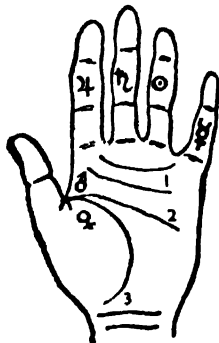
'Palmetto State,' see SOUTH CAROLINA.

Palmgren, Selim (b. 1878), Finnish pianist, conductor, and composer, b. at Björneborg. He studied at the Helsingfors conservatoire, where Wegelius was among his masters, and later with Ansgoro in Germany and Busoni in Italy. On his return he became conductor of the Finnish Students' Choral Society and later of the Musical Society at Aabo. He also frequently appeared as a pianist, being a brilliant executant. P. married the singer Maikki Järnefelt, toured Europe and U.S.A. with her, and in 1923 settled as prof. of composition at the Eastman School of Music at Rochester, New York. His works, at times reminiscent of Grieg, include operas, *Daniel Hjort* and *Peter Schlemihl* (after Chamisso); incidental music to Kyösti's *Tukhimo* (*Cinderella*); choral works; two pianoforte concertos, *Metamorphoses* and *The River*; and numerous pianoforte pieces, etc.

Palmiet, see PALMITE RUSH.

Palmira, tn. of Colombia, S. America, in the dept. of Valle. It is situated on the Llanos de Malajana at an altitude of 3000 ft. Grows tobacco, coffee, cacao, sugar, and rice. It is reached by rail from Buenaventura (144 m.). Pop. 45,000.

Palmistry, or **Cheiromanancy** (Gk. *cheir*, the hand; *μαντιχ*, divination, or *μαντεία*, prophecy), the art of reading a person's character and the chief events of his life from the general contours of his hand, and, in particular, from the lines upon the palm. Though in modern times it has fallen into disrepute through being exploited for gain by more or less ignorant 'fortune-tellers,' it was in early times highly esteemed, and is mentioned with respect by Pliny, Aristotle, and other



ancient writers. Aristotle declared that 'the lines are not written without cause in the hand of man, but come from celestial influence and the peculiar human individuality'; and more recent authorities seem to agree that there is a close connection between the sciences of P. and astrology, and assert that the study of a person's nativity invariably corroborates the deductions drawn from his hand by a reliable palmist. The different parts of the hand are named after the planets, the thumb belonging to Venus (♀), the first finger to Jupiter (♃), the second to Saturn (♄), the third to Apollo or the Sun (☉), and the fourth to Mercury (☿), while there are also the 'mounts' of the Moon (♌) and of Mars (♂). The chief lines are those of heart, head, and life (1, 2, and 3 in diagram), but all small markings, crosses, etc., must be taken into consideration, the rules upon which an adequate judgment is based being extremely complex. It is claimed that the lines are continually altering in accordance with the development of a person's tastes and character; also that markings signifying particular events appear temporarily and vanish when the event has taken place. With regard to the general significance of shape and lines, a study of drawings of typical hands in any reputable book on the subject will be found suggestive and interesting. See S. D'Arpentigny, *La*

Chirognomie, 1843; A. Desbarrolles, *Les Mystères de la main*, 1859; H. Beamish, *The Psychonomy of the Hand*, 1865; A. Raphael, *Cheirosophy*, 1901; Cheiro, *The Language of the Hand*, 1911; and W. G. Benham, *The Laws of Scientific Hand Reading*, 1901, and *How to Choose Vocations from the Hands*.

Palmite Rush, or **Palmiet** (*Prionium palmita*), evergreen perennial plant (family Juncaceae), native of S. Africa, with broad, linear leaves, which are deeply channelled and finely serrated, and small greenish-golden flowers. The leaves are used in thatching, and the fibre in the leaf sheaths is sometimes employed in brush-making.

Palmitic Acid ($C_{15}H_{31}O_2$) = $CH_3 \cdot (CH_2)_{13} \cdot COOH$ occurs in combination with glycerol in many oils, fats, and waxes. Beef and mutton tallow, and lard, contain the glyceride of P. A. This glyceride is known as palmitin, a white solid. Palmitin is also the chief constituent of palm oil. When a piece of tallow is shaken up in caustic potash solution, the solution becomes milky and forms a lather; thus a soapy solution is obtained, and the fat is said to be saponified by caustic potash. If a soft fat is treated with caustic soda until it is dissolved and the clear liquid poured off, addition of hydrochloric acid to this liquid gives an immediate precipitate of a fatty substance. This substance is termed P. A. It is a colourless, fatty body, melting at $62^\circ C$. It is insoluble in water, but soluble in alcohol and solutions of alkalis. The acid combines with the bases to form soap, this being manufactured by treating fat and oil with the caustic alkalis. These soaps are soluble in soft water, but not in hard. Palmitin and stearin, which are very similar in properties, mostly occur together, and may be separated from fats as a mixture of palmitic and stearic acids by superheated stearin. P. A. is oxidised by potassium permanganate to a mixture of acids—oxalic, succinic, adipic, acetic, etc. P. A. is best made from jap. wax by hydrolysis with KOH followed by the action of hydrochloric acid and purification *in vacuo*.

Palm Oil, fat extracted, by boiling and skinning, from the pulp of the fruit of various palms. It has a butter-like consistency, a dark orange colour, and, when fresh, a pleasant odour. It mixes with turpentine and ether, and melts at $27^\circ C$. Both P. O. and palm kernels are derived from the fruit of the oil-palm. A fibrous pericarp contains the oil and covers the shell, which is cracked to obtain the kernel of commerce. In W. Africa the edible pericarp oil is extracted by crude methods and the nuts are cracked by women and children. Kernels are not used by the Africans, but are exported to Europe for crushing, and the oil is used largely in the manuf. of margarine and soap, and also candles as railway grease. Brit. W. Africa is the largest producer in the world and, except for a few European plantations, production is in the hands of Africans. Nigeria has exported as much as 380,000 tons annually, and the old name, 'Oil Rivs.', was once applied to

the Nile delta because, in the early hist. of the country, P. O. and kernels were brought down the waterways for trading at the ports. In 1922 the W. African trade began to encounter keen competition from the Dutch E. Indies and Malaya, which exported an oil superior in quality and with a lower percentage of free fatty acid. The Nigerian Gov. has taken steps to improve the existing palm groves and to induce the natives to use hand-presses; but progress is slow because it is difficult to persuade the natives to give up old methods. In the Gold Coast oil palm products were the staple agric. export before the development of cacao. The oil palm is also grown in Sierra Leone and there is a large consumption of P. O. for food purposes; but the fruit of the indigenous palm of that colony yields relatively little oil and breeding is confined to imported varieties. In Fr. Togoland the oil palm is an important source of revenue, and in parts of the Belgian Congo the oil palm has always been important in native economy as a source of food and other products, but large areas have been planted at different times and then abandoned.

Palms, Palmaeae, or Palmae, large and exceedingly important family of monocotyledons, represented by only a single species in Europe, *Chamerops humilis*, a pretty little fan-palm, which, though comparatively hardy and much grown as a room plant, and also outdoors in mild dists., is not a native of Britain. A few others, especially *Areca baueri* and *sapida*, *Chamerops excelsa*, *Erythea armata* and *edulis*, *Cocco australis*, *campestris*, and *yalay*, *Jubaea spectabilis*, *Kentia canterburyana*, *Livistona australis*, *Nannorops richiana*, *Phoenix canariensis*, *dactylifera*, and *senegalensis*, *Rhapiz flabelliformis* and *humilis*, and *Washingtonia filifera*, are sufficiently hardy to live permanently outdoors in the warmest parts of Britain. All other members of the family are tropical or subtropical. All are perennial, and are either arborescent (some of them rising to a height of 100 to 200 ft.), or have no apparent stem, the plant rising from a short or prostrate rhizome. With the exception of the doom palm (*Hyphene thebaica*), all are unbranched and grow by the terminal bud, where in many cases leaves form an immense crown. These are usually of the fan-shaped and radiate or pinnelved types, or intermediate between them, and in many cases are each many feet in length. The flowers are borne upon a spadix, sometimes of great size, and enclosed, at least at first, in a large spathe, which, though often hard and woody, is similar to that of arums. Each flower is sessile on the spadix, and consists of a six-leaved or six-parted perianth, greenish or yellowish in colour; there are usually six stamens and a pistil, commonly with three carpels, but occasionally with fewer. The fruit varies greatly in size and structure; it may be drupaceous or nut-like or berried. The absence of a taproot, characteristic of all monocotyledons, is compensated for in some species

by the lengthening of the cotyledon downwards to a considerable depth, which thus gives stability to the tall-growing stem. The family consists of over a thousand species, which are divided into six tribes, the prin. species of which are dealt with under their own headings. The uses of many of the species are numerous and very varied, their least value being as timber. An exception is *Sabal Palmella* of Central America, the timber of which is very durable; the wood of many other palm-trees is utilised, but is not of great importance. Among the more important fruit products are the coco-nut (*Cocos nucifera*), date (*Phoenix dactylifera*), coquilla nut, vegetable ivory from the seeds of *Phytolophas macrocarpa*, palm oil from the fruits of the oil palm, and the betel-nut. Sago and other similar foods are obtained from the soft pithy centres of the stem of the sugar-palm, the wine-palm, and other trees. The huge leaves are put to many uses. From Elche, Spain, large quantities of them are exported for ritual and decoration on Palm Sunday (the so-called 'palm' carried on this day in Britain is, however, the willow). The leaves of the Palmyra palm are used by natives instead of paper or parchment for records. Those of most P. are much used for thatching and similar purposes, and many are employed in making 'straw' hats. From some fibre is extracted and put to many uses. The leaves of *Copernicia cerifera* are covered with a wax utilised in candle-making. Incredible though it may sound, the midribs of the leaves of *Melroydon*, the sago palm, are split to provide flooring and panelling boards. Malacca cane is obtained from species of *Calamus*. Most of the P. suitable for culture in Britain are propagated from seeds, which are sown thickly in pans containing good fibrous loam and silver sand. The seeds germinate very slowly, and are hastened by affording bottom heat from a hot-bed or pipes under a bench. Early spring is the best time for sowing; the seeds are lightly covered and not allowed to become dry. After the first leaf is formed, the young plants are potted singly and repotted as necessary. Decorative P. need shading from the sun and liberal watering. The leaves should be sponged occasionally with tepid water and a little soap. Most P. that are cultivated in Britain require a temp. of about 55° in winter and 70° in summer. Careful hardening off is desirable before the plants are removed to dwelling-rooms. A rich dark green colour of the foliage is encouraged by occasional applications of liquid manure and soot water. See B. Seegman, *History of the Palms*, 1856; A. B. Rendle, *Classification of the Flowering Plants*, 1925; and E. Blatter, *The Palms of British India and Ceylon*, 1926.

Palm Sunday, last Sunday in Lent and therefore the Sunday before Easter (g.v.). As is well known this day obtains its name from Christ's triumphal entry into Jerusalem with the children waving and spreading branches of palms before Him. The only remnants of special ceremonies

in a large section of the Eng. Church consist in the decoration of the altar and church with palms, but in Rom. Catholic and E. churches an elaborate ceremonial, including a procession of palms, takes place on this day.

Palmyra, anct. city standing in an oasis of the Syrian desert, 150 m. N.E. of Damascus. It is now a mere collection of Arab huts, but wonderful ruins exist. It is called by the Arabs Tadmor, and is supposed by some to have been built by Solomon (2 Chron. viii. 4). This can scarcely be the case, P. having been a flourishing city some considerable time before that given for Solomon's birth. It formed a halting-place for the caravans between Syria and Mesopotamia, and hence grew into a rich, commercial city. The bulk of the pop. was of Arab blood. The city reached its greatest period of wealth and splendour under Hadrian and the Antonines. (For the revolt of the Palmyrenes against the Romans, see ZENO-BIA, the famous queen of P.). The city was destroyed by Aurelian, A.D. 273, and the inhabitants massacred. It never recovered its former glory. Remains include a temple of the sun, walls, and a colonnaded street with a triumphal arch. See A. Masli, *Palmyrena*, 1928, and M. Rostoutzeff, *Caravan Cities*, 1932.

Palni Hills, ranges of mts. in the W. of the Madurai dist., Madras, India, consisting of an E. and W. range, and reaching a height of 7000 ft.

Palo Alto: 1. Banking tn. of Santa Clara co., California, U.S.A., 30 m. S.E. of San Francisco. It is in the centre of an agric. and fruit-growing dist., with fine views of the coast range. The Leland Stanford Univ. (opened 1891) is 1 m. away, and there is a Rom. Catholic theological seminary. Pop. (1940) 16,700. 2. Battle-field of Cameron co., S. Texas, U.S.A., between Point Isabel and Matamoros. The Amers., under Taylor, defeated the Mexicans here (1846).

Palolo Worm, annelid which is widely distributed around the S. Pacific Is. It makes its appearance once a year at the full Oct. moon on the surface of the seas around Samoa and the Fiji Is. It occurs in vast numbers, and the natives value it highly as a food, eaten raw.

Palomar, mt in California, U.S.A., 35 m. inland from the coast, and 66 m. N. of San Diego, a peak of the Santa Anna Mts. There is an observatory with a 200-in. reflector, the largest in the world (see MOUNT PALOMAR OBSERVATORY).

Palomides, Sir, see PALAMIDES.

Palomino de Castro y Velasco, Don Aciselo Antonio (1613-1726). Sp. painter and writer on art, sometimes called the 'Sp. Vasari,' b. at Bujalance, Cordova. He assisted Coello with the frescoes of the queen's gallery in the Alcazar (1686), and was appointed court painter to Charles II. (1688). On his wife's death in 1725 he took priest's orders. His oil-paintings were better than his frescoes, but he is chiefly remembered for his *El Museo pictorico y escala optica* (1715-24), of which the third part, with the sub-title, *El Parnaso español pintoresco laureado*,

contained biographies of Sp. painters. Abridgments appeared in Eng. (1739), Sp. (1742, 1744), Fr. (1749), and Ger. (1781), and a reprint of the whole work in Spain in 1797. See J. A. Cean-Berindez, *Diccionario de los mas ilustres profesores de las bellas artes en España*, 1800; and Sir W. Stirling-Maxwell, *Annals of the Artists of Spain*, 1848.

Palsy, see PARALYSIS.

Paludan-Müller, Frederik (1809-76), Dan. poet, third son of Jens P.-M., sometime bishop of Aarhus, b. at Korteiminde. On his father removing to Odense in 1819 Frederik attended the Lat. school of the city, eventually entering Copenhagen Univ. to study law, but he never practised. Whilst there he pub. four little romances, and inspired by his study of Shakespeare and Gozzi produced the romantic drama *Love at Court* in 1831, and gained thereby his passport into the society of belles-lettres of the cap. His successful *Dandserinden*, which shows traces of Byron's influence, appeared in 1832. *Amor and Psyche*, probably his most finished work, was pub. in 1834. He settled down to a quiet and studious life in a cottage on the royal estate at Fredensborg. *Zuleima's Flight and Beatrice* were written in 1835-1838, *Venus* in 1841. During 1841-48 he was engaged upon his greatest work, which has become a Dan. classic, *Adam Helms*. This was followed in 1844 by the three graceful idylls, *The Dryad's Wedding*, *Tithon*, and *The Death of Abel*. Excepting the drama of *Kalanus* in 1854, P. afterwards produced nothing of particular merit for some years, until he composed with all his former charm and power what was to prove his 'swan-song,' the beautiful poem *Adonia* (1874). See lives by F. Løche, 1899, and V. Andersen, 1910.

Paludrine, $C_{10}H_{12}N_2Cl$, antimalarial drug first synthesized in 1944. Up to that time the chief drug used to fight malaria was quinine, but this does not function until some time after the disease has entered the body and then often fails to produce radical cures. P. not only destroys the malaria parasites in the blood but when administered at the correct time prevents the infection from developing. It is well tolerated in man; doses up to 1.5 grams a day have been given, while as little as 10 milligrams a day gives an action in the clinical phase of malaria.

Palwal, tn. in Gurgaon, E. Punjab, India, 37 m. S. of Delhi. It is a very anct. city. Pop. 13,600.

Pamaquin, synthetic drug used against malaria. It occurs as a granular, pale-yellow powder, and may be used either alone or with mepracrine or cinchine.

Pamfil, Giovanni Battista, see INNOCENT (popes), Innocent X.

Pamiers, tn. and episcopal see of Ariège dept., France, on the Ariège, 35 m. S.E. of Toulouse. There are iron works and mills, and numerous gardens and vineyards in the dist. Pop. 12,000.

Pamirs, mountainous region forming the nucleus of the central Asiatic highland system. They connect the highlands of the Hindu Kush and Himalayas with those of the Tian Shan, whilst the depressions

of the Amu and of E. Turkestan border the region. The Hindu Kush and the Himalayas from the S.E., the Kuenlun from the N.E., meet here. The region is termed by the dwellers there the 'Roof of the World' (*Ham-i-Dunya*), the word *pamir* (meaning an upland plain or valley) being a name there applied to the riv. valleys. On three sides the plateau is bordered by high mts., as stated above; on the S.W. there is no such mt. wall, but an abrupt descent to the valley of the Panj. The length of the P. is about 240 m., and breadth from 120 to 150 m., the area being about 30,000 sq. m.

The chief peaks in the N. are the Kilil-agva (21,700 ft.) and the Kaufmann (23,000 ft.); in the E., Mt. Charkum (22,500 ft.) and the Mustag-ata (c. 26,000 ft.). Across the plateau ridges run in various directions, principally from E. to W., enclosing the P. or flat, broad riv. plains. The chief rivs. of the P. are the Wakhan Daria (afterwards the Panj) and the Murgab R., both rising in Lake Oikul, and descending to the Aralo-Caspian depression. The ridges running across the P. are crossed in places by passes, of which may be mentioned the Andamin Pass (15,500 ft.), from the Great to the Little P., and the Khargosh Pass (14,550 ft.), from the Great Pamir to the Tareh Pamir. Various lakes are found on the P., of which the chief are the Great Karakul in the N.; Rang-Kul in the middle; Yashil-Kul, Zorkul, and Oikul in the S.E. Of the P. proper the prin. are the Khargoshi Pamir, round Great Karakul Lake, Rang-Kul, and Allichur; the Great Pamir, round Lake Zorkul; the Little Pamir, round Lake Oikul; and the Taghdumbash Pamir. The theory of Younghusband is that these elevated plains were originally deep riv. gorges, which have gradually been filled up because the debris falling from the mts. on either side has accumulated too rapidly to be washed away by the streams. The culminating point of the Pamir region is reached in the Kung-ling or Onion Mts., and between the Mustag-ata and the Tein Shan the mean altitude is about 20,000 ft., whilst the average height of the P. as a whole is over 12,000 ft. The climate is colder in the centre of the plateau, and the snowfall not so great there as in the other parts; the whole region is destitute of trees or shrubs; along the banks of the streams very fine pasture is found, to which the Kara-Kirghiz nomads bring their flocks in the summer season. These are practically the only inhab. of the P., though the peripheral dists. of Darvaz, Roshan, and Shughan are inhabited by Tajiks. The Russian surveys of Grombchevsky, Bogdanov, Featschenko, Muschketov, and Severyzov, and the journeys of Mr. and Mrs. Littledale, M. Dauvergne, Dr. G. Capus, Sir Francis Younghusband, Sven Hedin, etc., have much increased the knowledge of the geography of the region. The Russian and Brit. boundaries were settled by the Pamir Boundary Commission of 1895. The P. are for the most part in the Tajik S.S.R. See Lord Dunmore, *The Pamirs*, 1893; *Report of the Boundary*

Commission, 1897; and Sven Hedin, *Through Asia*, 1898.

Pampa, La, see LA PAMPA.

Pampas (*Quichua*, plains) are wide treeless plains found in the Argentine Republic, stretching from Rio Colorado N. to Gran Chaco, and from the foothills of the Andes E. to Parana and the Atlantic coast. They rise gradually from the ocean, and the E. portion is covered with grass, and supports large herds of cattle, sheep, and horses, whilst the W. is more sterile. The soil of the P. consists of sands and clays, and is possibly the bed of an anct. sea, or the remains of former Andean glaciers, or of granite or other primitive rocks. The characteristic vegetation is the 'pampas' grass (*q.v.*), which grows to a height of 8 or 9 ft. Birds are more numerous than other species of fauna. Area about 250,000 sq. m. The name P. is also applied to other similar plains on the Atlantic coast.

Pampas Grass (*Gynnerium argenteum*), genus of beautiful and almost hardy Amer. grasses. *Cortaderia argentea* (which is an alternative name for the genus) is the best-known species in gardens, and on light, deeply worked soils and in sheltered positions it will survive sev. degrees of frost. The large, upright, plume-like, white or silvery panicles of flowers appear in Sept. and Oct. *C. rubata*, a less hardy species, bears taller rose-coloured panicles.

Pampas Hare, see VISACACHA.

Pampean Language, see under SOUTH AMERICAN NATIVE LANGUAGES, *Southern Grasslands and Forests*.

Pampeluna, see PAMPLONA.

Pamphlets. *Origin of the word is unknown.* Among the various conjectured sources two of the most probable are the O.F. *paume-feuille* (hand leaf, i.e. leaf of paper held in the hand) and the Fr. *par un fil* (by a thread), but both these are more fanciful than convincing. The term pamphlet in a general sense signifies a small treatise occupying fewer pages than a book, on some question or subject of current or temporary importance of a social, personal, political, or eccles. nature, controversial or otherwise, in which the writer endeavours to appeal to the public. Speaking technically it implies eight or more pages of printed matter, not exceeding five sheets, stitched together, with or without a thin paper cover. It is first found in the Lat. form *pamphletos* in Richard de Bury's *Philobiblon* (1344), and early made its appearance in Eng. literature; Occleve making use of 'though that this pamphlet' in *De Regimine Principum* (1412). Ludgate relates in *Minor Poems*, 'which in a pamphlet I redde' (1430), and in Chaucer's 1400 ed. of *Eneydos* we find 'diverse pamphlettis and bookys.' An immense impetus was given to pamphlet writing by the Marprelate controversy in 1559, as instanced by the writings of Nashe, Thomas Cooper, the Harveys, and others. The various witch controversies of the period, especially in the case of the Lancashire trials of 1612 recorded by Thomas Potter, helped to increase the output. Richard Greene likewise caused diversion by his social P., exposing the rogues of

Elizabethan London, the most famous being *A Notable Discovery of Coosnage* (1591) and *A Defence of Coney-Catching* (1592). Contemporary with these are those quaint literary productions, the tobacco P., and political P. and news-sheets (the germ of the modern newspaper) began to appear. Political P. were to multiply quickly during the Caroline reigns, helped by the intervening period of rapid Puritanism, culminating in Anne's time in what Dr. Johnson designated the age of P., enlisting such able pens as those of Addison, Steele, and Swift. To touch on all the subjects of the pamphlet writers would be to recapitulate the prin. events of modern hist.; but in England such matters as the Corn Laws, Home Rule, S. African war, Imperial Federation, and the Dreyfus case in France, may be cited as having brought forth their full share of this class of literature. A series of well-informed P. was issued during the Second World War by the Oxford Univ. Press, entitled 'Oxford Pamphlets on World Affairs,' and dealing with the foreign policies of different countries, the economics of the war, racial questions and special problems, such as the Jewish question, encirclement, living spaces, the Danubian basin, colonial raw materials, etc.

Pamphylia, anct. country on the S. coast of Asia Minor, bounded by Lycia and Cilicia. The chief twn. were Aspendus, Perga, Attalia, and Ollbia. This country formed at first part of the Persian Empire, but afterwards passed successively to Macedonia, Syria, and Rome.

Pamplosa, or **Pampeluna**: 1. (Basque *Iruña*), cap. of the prov. of Navarre, Spain, in the Pyrenes Mts., 195 m. N.N.E. of Madrid. It is also a strong fortress and possesses a fourteenth-century cathedral. Pop. 70,900. 2. Tn. of Colombia, in the dept. of Santander del Norte, 210 m. N.E. of Bogota, at an altitude of 7000 ft. It is connected by rail with Cucuta and Enconcordes. It is an episcopal see, and is in the vicinity of abandoned gold and silver mines. Other minerals, including iron, coal, lead, and copper, are found in the neighbourhood. Its chief products include dyewoods, gums, coffee, cacao, coal and gold. There are breweries and distilleries, and also textile factories. Pop. 22,000.

Pan, great god of flocks and shepherds among the Gks., usually called a son of Hermes, was originally an Arcadian god, and Arcadia was always the prin. seat of his worship. From that country his name and worship afterwards spread over other parts of Greece, but at Athens his cult was not introduced till the time of the battle of Marathon. He is described as wandering among the mts. and valleys of Arcadia, either amusing himself with the chase, or leading the dances of the nymphs. He loved music, and invented the syrinx or shepherd's flute. P., like other gods who dwell in forests, was dreaded by travellers, to whom he sometimes appeared, and whom he startled with sudden terror. Hence sudden fright without any visible cause was ascribed to P., and was called

a *Panic* fear. The Romans identified their god Faunus with P. In works of art P. is represented as a sensual being, with horns, puck-nose, and goat's feet, sometimes in the act of dancing and sometimes playing on the syrinx. For the celebrated story told by Plutarch, 'Great Pan is Dead,' see Habels, chap. xxviii., and J. O. Lawson, *Modern Greek Folklore and Ancient Greek Religion*, 1910.

Panama: 1. Republic of S. America, which, prior to 1903, when it asserted its independence, was a dept. of Colombia. Its area is 28,576 sq. m., its length 480 m.; coastline, 426 m. on the Atlantic and 767 m. on the Pacific; breadth from 37 to 110 m. It is a strip of land branching out westward from Colombia and co-extensive with the isthmus of P. The U.S.A. recognised its independence in 1903 and, shortly afterwards, the remaining powers did so. (For the terms of the treaty with the U.S.A. relative to the P. Canal zone see PANAMA CANAL ZONE.) But it was not until 1914 that Colombia agreed, under the treaty of Bogota, to recognise the independent status of P. This treaty was ratified by the two govts. in 1921, and in 1924 a protocol was signed by the plenipotentiaries of P. and Colombia establishing diplomatic relations between their respective countries. The W. or Costa Rican boundary was determined in 1910, but, after ratification, the question of the true demarcation was referred to the chief justice of the U.S.A., whose award, delivered in 1914, was rejected by P. The U.S. Gov. insisted on the award being upheld, with the result that the ter. in question was occupied by Costa Rica. On March 2, 1936, a new treaty between P. and the U.S.A., ratified by the U.S. Senate on July 25, 1939, annulled the former provision by which the U.S.A. 'guaranteed the independence of P.' but permitted the U.S.A., in the event of war, to defend the canal in any way necessary. The U.S. Gov. paid P. \$10,000,000 for the canal zone rights and, from 1913, \$250,000 yearly. A later treaty, ratified by P. in 1936, and by the U.S.A. in 1939, increased the ann. payment to P. to 430,000 balboas. A disadvantage to P. is that the city of P. is left practically without a seaport, inasmuch as the anchorage at Balboa and Flamenco ls. lie within the delimited zone. In Sept. 1939 the president of the U.S.A. placed the canal and the zone under the control of the U.S. Army, and in Jan. 1942 he estab. Amer. naval control over the gulf of P. and the maritime approaches to Cristobal.

Provinces and Population.—There are eight provs., with pops. for 1940 (caps. in brackets): Bocas del Toro (Bocas del Toro), 10,000; Chiriqui (David), 92,000; Coclé (Penomene), 55,800; Colon (Colon), 57,300; Los Santos (Las Tablas), 49,700; P. (P. city) 172,000; Herrera (Chitre), 38,100; Veraguasa (Santiago), 83,500. The pop. of P. city in 1940 was 111,800, and of Colon, 44,000. The total pop. of P. (excluding the canal zone) in 1940 was 622,600, including about 69,000 white; 83,000 Negroes; 56,000 native Indians (living in tribes); and over 400,000

mestizos or mixed. There are about 23,000 Brit. subjects on the isthmus, chiefly coloured people from the W. Indies. The estimated pop. in 1918 was 680,500. Under the constitution the immigration of the following is prohibited: Negroes whose original language was not Sp., yellow races and original races of India, Asia Minor, or N. Africa. The official language is Sp. Some 93 per cent of the pop. is Catholic and 6 per cent Protestant.

Constitution and Justice.—The new constitution promulgated in 1946 continues the pre-existing provisions for a National Assembly of thirty-two members. Deputies are elected for four years. The assembly meets biennially on Jan. 2. The term of the president of the republic, elected by direct vote, is also four years, and he is not eligible for a second term. The supreme court consists of five justices appointed by the executive.

Education is obligatory for all children between seven and fifteen years of age and co-education has been adopted. The gov. maintains 815 primary schools (sixteen for native Indians), attended by 91,000 children in 1948, and seventeen post-primary schools, with 5000 students. There is a univ. and a school of arts and crafts; but a number of students are sent at the gov.'s expense to the U.S.A. and Europe for their education. The Bolivarian univ., founded at P. city in 1926, is supported by a number of other S. Amer. republics as a pledge of pan-Amer. solidarity. A new normal school, opened at Santiago in 1938, is attended by 1160 students of both sexes. There is also a professional school for young women.

Production.—The soil is very fertile but not by any means fully cultivated. The chief exports are bananas (3,500,000 stems in 1947, mostly to the U.S.A.), coconuts, hides, abaca fibre, tortoise-shell, and rubber. Coffee is cultivated in Chiriquí prov. near the Costa Rican border, while timber, sugar, copaiba, sarsaparilla, ipecacuanha, and rice are also produced. Cautchouc is grown near the coast by European planters, but rubber exports have been small in the past two or three decades. Beer production is a national monopoly, and in 1947 the quantity produced was over 21,000,000 litres. Whisky, gin, and rum are also produced. Tobacco is exported; cattle are reared and hides exported to some extent; pearls from the Pearl Is. and Coliba Is. and turtle-shell are also exported. P. has nearly every valuable mineral except coal, but the mines are not much exploited. The republic, possessing few industries, subsists largely on the P. Canal (in services to its employees) and on tourist and transit traffic. Exports are far below imports, the approximate figures for the five years before the Second World War being between 3,500,000 and 4,250,000 balboas for exports and between 18,000,000 and 23,000,000 balboas for imports; between 1940 and 1945 exports ranged between 2,000,000 and 4,500,000 balboas and im-

ports between 24,000,000 and 40,000,000 balboas. In 1947 exports were 8,500,000 balboas and imports 75,700,000. This heavy adverse balance is met by invisible exports such as the expenditure of canal zone employees, U.S. Army and Navy personnel, and tourists. The greater part of the country's trade is with the U.S.A., with the United Kingdom in the second place, chiefly in imports from the latter.

Communications, etc.—The P. railroad, the shares of which are held by the U.S. Gov., is 162 m. long and links P. city with Colon. It passes through the canal zone and the bulk of the goods consigned to P. passes over it, there being no road over the isthmus. Most ships unload at Cristobal at the entrance to the canal. There is a narrow-gauge railway between Pedregal and David and a line between David and Concepción. There is at present a road from P. city westward as far as David. Work on its extension to the Costa Rican border was expedited by Amer. engineers as a war measure so as to complete the Panamanian link in the highway from the U.S.A. to the P. Canal. Commercial aviation has developed rapidly in P. Daily air services, in both directions, connect P. city and David. Daily air mail and passenger services operate between P. and New York. There are telegraph cables from P. to N. and S. Amer. ports, from Colon to the U.S.A. and Europe. The Pacific ports are Puerto Mudas, Pedregal, Dulce, Montijo, and Puerto Armuelles; the Atlantic ports are Puerto Bello, Bocas del Toro, and Colon.

Defence.—P. supports no army or navy, but during the Second World War a militia force was formed with the assistance of U.S. officers. In 1941 P. granted air and anti-aircraft bases to the U.S.A. for the defence of the canal zone.

See W. R. Scott, *The Americans in Panama*, 1912; A. Edwards, *Panama: the Canal, the Country, and the People* (revised ed.), 1914; A. H. Verrill, *Panama Past and Present*, 1921; C. H. Forbes-Lindsay, *Panama and the Canal Today*, 1926; H. G. Miller, *The Isthmian Highway: a Review of the Problems of the Caribbean*, 1929, and W. D. McCann, *The United States and the Republic of Panama*, 1937.

2. P. city, cap. of the republic of P. The original tn. was founded by the Spaniard, Pedro Arias de Avila, who in 1514 amalgamated the sev. Sp. colonies in Central America under the name of Tierra Firme and about five years later founded P. city. This city was sacked and burnt by the famous Eng. buccaner, Henry Morgan (q.r.), in 1671 and rebuilt in 1673 during the governorship of Fernandez de Cordova on a site 4 m. W.S.W. of the previous site. According to Esquemeling the original P. was a city of wealth and luxury of 30,000 inhab., with some 5000 stone houses and thousands of large houses of cedar. P. city stands on a rocky peninsula at the foot of an extinct volcano known as Ancon Hill and is on the S. side of the isthmus at the head of the Gulf or bay of P. Since the republic gained her independence the cap. has undergone many improvements, and the \$10,000,000

paid by America for the lease of the canal has enabled the Panamanian Gov. to erect a number of handsome buildings, which have much altered the aspect of the old city. The main thoroughfare is the Avenida Central, which is traversed by electric cars. The weather-worn cathedral (founded in 1760) took nearly ninety years to complete. It was erected at the expense of a Negro, who from lowly origin rose to be bishop of P. Its chief features are the twin towers, the domes of which are encased in mother-of-pearl, said to have been brought from the pearl fisheries of Margarita. Among the other churches are San Felipe Neri, with an arch built 1688, and San Francisco, dated in 1740. Facing the cathedral are the episcopal palace and old Gov. Palace. Among the new buildings one of the most noteworthy is the handsome Palacio Municipal or city hall. At the lower end of the Avenida is the group of gov. buildings, at the back of which is the handsome National Theatre, one of the finest buildings of the kind in this part of the world. The Malecon, or sea wall, is a popular promenade; to the W. of it is another sea wall, that of Las Bovedas, under which are the old prisons. At the foot of Ave. n. 1911 is the Instituto Nacional, P.'s univ., which was opened in 1911. The houses of P. city are built of stone and roofed with red tiles and rarely exceed two or three storeys in height, and their overhanging balconies accentuate the narrowness of the streets, which are remarkably picturesque. Pop. 111,800. See J. Esquemeling, *Bucaniers of America*, trans. from the Dutch by Wm. Crooke (London), 1684 (Esquemeling or Oexmalin was a buccaner with Morgan and his book is the only first-hand source of all the facts pub. in the Calendar State Papers and used by biographers since); A. H. Verrill, *Panama Past and Present*, 1921; and P. James, *Latin America*, 1942.

Panama Canal, designed in 1879 by Ferdinand de Lesseps (q.v.), who constructed the Suez Canal as a tide-level canal. Gomera (1510-60) advocated a canal; in the sixteenth century the Panama, Nicaragua, and Tehuantepec routes were discussed. A Colombian concession granted to Lt. Wyse was sold to the Panama Canal Company, and work of survey, etc., was commenced in 1881. The estimate of cost was about \$33,000,000, reduced by de Lesseps to \$24,000,000, and the work was to be completed in 1888. With less than one-quarter the work done and \$74,000,000 estimated debt, the company was forced into liquidation in 1889. In 1892-93 occurred the Panama scandals in France, leading to the imprisonment of de Lesseps, his son Charles, and others; mismanagement, bribery, corruption, and fever had ruined the scheme. Up to 1902 \$60,000,000 had been expended, only \$12,000,000 effectively. The chiefs of the Fr. Canal Company, convinced that they were unable to complete the work, commenced negotiations with the U.S. and Colombian Govs. The U.S. offer of \$5,000,000 for the company's rights and

assets was accepted by the Herran-Hay Treaty (1902). This treaty was strongly opposed by Colombia, and its ultimate rejection led to Panama proclaiming her independence in 1903, and signing the Canal Treaty in Nov. of the same year (see PANAMA CANAL ZONE) under which the work progressed. The necessity of the work was brought home to the U.S.A. by the voyage of the S.S. *Oregon* from San Francisco to Cuba in the Sp.-Amer. war, the ship having to sail round Cape Horn. When the U.S.A. eventually made arrangements to dig the canal, it paid the republic of Panama a bonus of \$10,000,000, the Fr. canal company \$10,000,000. In 1925, mainly to obtain the goodwill of the S. Amer. republics, it paid Colombia \$25,000,000. Work on the canal was finally started by the Amers. in 1905, and in 1920 President Wilson declared it formally completed. The digging of the canal was made possible by the work of Wm. C. Gorgas, then a surgeon in the U.S. Army, who, with 2000 assistants, removed the sources of yellow fever and malaria, and made the canal zone as healthy as any place in the U.S.A. The engineering work was entrusted to George W. Goethals (q.v.), then a colonel in the engineering corps of the U.S. Army. Actual excavation work was begun in 1906, with a force of 45,000 men. The clerks, foremen, and officials were Amers., but the manual labour was mainly performed by Spaniards, Ita., and Negroes. Huge steam shovels were employed, the soil being hauled off by about 800 trains of twenty-three cars each. A total of 210,000,000 cub. yds. of earth was removed. The canal cost \$366,650,000, exclusive of appropriations for its defence.

It lies between the 8th and 10th parallels of N. lat. and the 79th and 80th meridians W. long. It connects the Caribbean Sea with the Pacific Ocean. It runs from N.W. to S.E. almost at right angles to the axis of the isthmus. The canal zone, which belongs to the U.S.A., includes all land extending 5 m. on both sides of the centre line of the canal channels. By the terms of the treaty the city of Colon on the Atlantic side and Panama on the Pacific are retained by the republic of Panama, but the U.S.A. makes itself responsible for their hygienic condition. The total area of the canal zone is approximately 551 sq. m., including Gatun Lake, with 106.40 sq. m., and Miraflores Lake, with 1.90 sq. m. In passing through the canal from the Atlantic to the Pacific a vessel goes through a dredged channel 500 ft. wide, 40 ft. deep at mean low water, and 5-77 m. long, leading to the Gatun locks, the first of a series of three locks. The Gatun locks, which consist of three flights of chambers, raise the vessel from sea level to Gatun Lake, a lift of 85 ft. The locks are double, being 1.04 m. long and 110 ft. wide. Each chamber is 1.00 ft. long, with intermediary gates which can shorten the length for smaller vessels and thus conserve water. All lift operations are controlled from a central station. The ship

is attached to electrically operated mules which run on tracks on both sides, pulling the ship through and keeping it in position, so that it will not damage itself or the mechanism of the locks. Once out of the locks the vessel proceeds under its own steam through a fixed channel in Gatun Lake. This varies from 500 to 1000 ft. wide and from 45 to 85 ft. deep. It does not follow a straight line through the lake, but goes through the former valley of the Chagres R., whose waters were used to form the lake. Once out of the lake the vessel enters Culebra Cut (now Gaillard Cut), a distance of 20.55 m. from Gatun locks. This cut is 300 ft. wide, 45 ft. deep, and 6.97 m. long. At the Pacific end of this cut the ship passes through San Pedro Miguel locks, a single flight of double chambers. This flight of locks is 0.75 m. long with a drop of 31 ft. to the level of Miraflores Lake. Passing through this lake is a fixed channel 500 ft. wide, 45 ft. deep, and 0.86 m. long. The ship then enters Miraflores locks, consisting of two flights of double locks 0.91 m. long with a drop of 54 ft., more or less, depending on the state of the tide, and thus reaches the level of the Pacific Ocean. The channel from Miraflores locks to the Pacific is 500 ft. wide, 35 ft. deep, and 6.99 m. long. In 1940 construction was begun on a new set of locks located approximately parallel to those at Gatun, Pedro Miguel, and Miraflores. A concrete dam, 974 ft. long and 223 ft. high, across the Chagres R. at Alajuela, was completed in 1935, creating Madden Lake, thus providing a reserve of 22 milliard cub. ft. of water for maintaining the level of Gatun Lake in dry seasons. The average time of passage through the canal is from 7 to 8 hrs.; the record passage is 4 hrs. 10 min. The total length of the canal from entrance to entrance is 43.85 nautical m. The ports of entry for the canal zone are Cristobal on the Atlantic side and Balboa on the Pacific. The maximum traffic capacity of the canal is estimated at 48 ships of usual size in a day or about 17,000 in a year. The gross capital investment for the construction, operation, and upkeep of the canal to June 30, 1948, totalled \$724,872,211, and the net investment, minus depreciation, was \$669,019,945. The net revenues (excluding interest charges on investments) have totalled \$273,500,000 since 1920. Net revenues from tolls and other sources during the year ending June 30, 1948, were over \$2,500,000. The total tonnages for the fiscal year ending June 30, 1948, were 24,117,000, comprising over 8,000,000 tons from Atlantic to Pacific, and over 15,000,000 tons from Pacific to Atlantic. Of a total of 4878 vessels, 2035 were Amer., 1041 Brit., 324 Norwegian, 180 Panamanian, 178 Honduran, 147 Swedish, 141 Dutch, 119 Dan., 99 Fr., 80 Colombian, and 69 Chilean. All ships passing through the canal have to pay the tolls except the gov. ships of the republics of U.S.A., Panama, and Colombia. See P. Bunau-Varilla, *Panama: its Creation, Destruction, and Reurrection*, 1913, and *The Great Adventure of Panama*, 1920;

F. J. Haskin, *The Panama Canal*, 1914; D. H. Smith, *The Panama Canal*, 1927; D. C. Miner, *The Fight for the Panama Route: the Story of the Spooner Act and the Hay-Herrán Treaty*, 1940; N. J. Padelford, *The Panama Canal in Peace and War*, 1942; and G. Mark, *The Land Divided: a History of the Panama Canal*, 1944.

Panama Canal Zone, strip of land some 5 m. wide, on both sides of the centre line of the Panama Canal, granted to the U.S.A. by the treaty of Nov. 18, 1903, with Panama. In the treaty Panama granted to the U.S.A. the use in perpetuity of the zone and, within its ambit, the exclusive control for police, judicial, and sanitary purposes. A new treaty, ratified by Panama in 1936, and by the U.S.A. in 1939, increased the ann. payment to Panama to 430,000 balboas. The zone is 554 sq. m. in area and of this area 106.40 sq. m. are occupied by Gatun Lake. The zone also includes about 20 sq. m. in the Chagres R. valley above Alajuela, assigned to the U.S.A. in 1924, with the view of constructing a dam at Alajuela. The pop. of the zone is 47,500, of whom 22,800 are Amers. There is no privately owned land in the zone, the zone being gov. property, dedicated to the purpose of protecting, operating, and maintaining the canal; but steamship companies may obtain building sites on licence, and agric. land can be licensed in limited tracts. The cities of Panama and Colon remain within the jurisdiction of Panama, but the U.S. Gov. is, by the treaty, given the control over both cities and over their harbours in matters relating to sanitation and quarantine. The status of the zone is that of a military reservation under the governor of the Panama Canal, who is appointed by the U.S. Gov. In Sept. 1939 the President of the U.S.A. placed the canal and zone under the control of the U.S. Army, and in January 1942 he estab. Amer. naval control over the gulf of Panama and the approaches to Cristobal.

Panama, Gulf of, inlet of the Pacific Ocean, formed by a curve of the isthmus, contains the Pearl Is. with their fisheries. Width 120 m., from Point Caracoles on E. to Point Mala on W.

Panama, Isthmus of, joins N. and S. America. Lat. 9° N., long. 79° 30' W.; length, 480 m.; breadth, 37 to 110 m. Its E. end separates the gulf of P. (Pacific) and Darien (Atlantic.)

Pan-American Conference or Congress. The first P.-A. C. was convened at Panama in 1826 by Simon Bolivar, the Venezuelan patriot, representatives from Colombia, Peru, Mexico, and Guatemala attending. An attempt was made to effect a treaty of federation, but the congress failed to do so, though it had far-reaching results in the direction of fusing Lat.-Amer. aspirations for their own corporate protection. This aim was definitely stated at the congress in 1856, when Peru, Chile, and Ecuador signed a continental treaty. The movement was hostile to the U.S.A., and in 1889 the U.S. Gov. invited Lat.-Amer. republics to a conference to discuss such questions as peace, customs,

and communications. All the republics attended, and recommendations regarding port duties, sanitation, freedom of rivers, common weights and measures standards, extradition of criminals, and intercontinental railways were considered. At further conferences in 1901, when President MacKinley attended, and 1906 and 1910, agreement was reached on arbitration in disputes, adherence to The Hague Convention of 1899 was agreed to, money claims adjusted, and the formal dedication of the Pan-Amer. Union (*q.v.*) was made. At the conference in 1923 Peru, Bolivia, and Mexico refused to attend. Three conventions were adopted, as follows: international disputes were to be examined by a commission, trademarks were protected, and customs documents were to be pub. The sixth congress, held in 1928, was attended by President Coolidge, when public and private international law was coded, and the subject of aerial navigation reviewed. Various Pan-Amer. scientific congresses have taken place. In 1915 President Wilson attended one, when discussions took place respecting improvement of cable services, telegraph and railway co-ordination. The seventh conference, held at Monte Video in 1933, was attended by all the Amer. republics except the Argentine, and the U.S.A. and nine other states sent their foreign ministers. This important conference gave Franklin Roosevelt's administration its first opportunity to expound the 'good neighbour policy' (see further under MONROE DOCTRINE). A declaration that 'no state has the right to intervene in the internal or external affairs of another' was strongly supported by Mr. Cordell Hull (*q.v.*) and unanimously adopted. This conference adopted over 100 recommendations for the promotion of inter-Amer. amity. Noteworthy too was a resolution for the removal of trade barriers, including high tariffs, a welcome reaction from the scandal of the Hawley-Smoot tariffs. President Roosevelt followed up this conference by proposing a special conference on the maintenance of peace, which met in Buenos Aires at the close of 1938, the opening session being addressed by him in person. Its most important result was a convention for the maintenance, preservation, and re-establishment of peace, which provided for general inter-Amer. consultation if any threat of war touched the New World, whether with an Old World nation or war between two Amer. nations. A treaty on the prevention of controversies set up a number of mixed commissions between Amer. states to devise means of avoiding future conflicts and a new protocol raised still higher the barrier against intervention by any one of the signatories 'for whatever reason in the internal or external affairs of any of the other parties.' The Amer. Senate ratified the peace convention or consultative pact. The eighth conference, held in Lima in 1938, met under the shadow of a second world war. Mr. Hull, apprehensive of Ger. penetration of S. America, wished to form a united front against

international aggressors; but Argentina was opposed to drastic action, and late in the war was the one Amer. republic to maintain an equivocal attitude towards the belligerents, even after Brazil, Mexico, and others had actually declared war on the Axis. However, the Declaration of Lima, adopted unanimously, affirmed the faith of the twenty-one Amer. republics in democracy and pledged them to consultation and, at least, to a measure of common action if any were menaced. Thus, under the impulse of common danger, Pan-America did at length achieve something for concord and security in the W. hemisphere, besides fostering closer commercial and cultural relations. In accordance with the declaration of Lima the foreign ministers of all the republics met for consultation at Panama city soon after the Second World War began. They adopted a statement of co-operative neutrality, defining their rights and privileges in a world at war. The Declaration of Panama asserted, though rather unrealistically, their inherent right to keep the waters used for normal inter-Amer. maritime communications 'free from the commission of any hostile act by any non-Amer. belligerent,' and to that end they adopted a neutrality zone (*q.v.*) which, however, never came into effect. The collapse of France led to a new meeting at Havana in July 1940, which resulted in the Act of Havana, an act which went far towards extending the Monroe Doctrine. This was an effort to safeguard Brit., Fr., and Dutch possessions in the W. hemisphere from Ger. seizure. The delegates also adopted a declaration to the effect that any attempt by a non-European state against the integrity of the tr. or political independence of an Amer. state should be considered an act of aggression against all the New World republics. In fact the Monroe Doctrine had now become a multilateral doctrine. After the Jap. had attacked the Amer. fleet at Pearl Harbour it is obvious that all the S. Amer. republics should have given practical expression to this joint declaration by breaking with the Axis and, but for the resistance of Argentina, this step would never have been delayed. The foreign ministers of all the republics again met, this time at Rio de Janeiro in Jan. 1942, and a declaration recommending severance of diplomatic relations was adopted, with Argentine and Chilean reservations; indeed Argentina's ambiguity was the great obstacle to a united Pan-Amer. front. Soon after this conference Brazil, Bolivia, Ecuador, Paraguay, Peru, and Uruguay broke off relations with the Axis. Mexico had done so before the conference, at the end of 1941. See also PAN-AMERICANISM. See *The International Conferences of American States, 1889-1928* (New York), 1931, and *First Supplement, 1933-40* (Washington), 1940; also C. H. Haring *South America looks at the United States*, 1928, and M. Margaret Hall, *The Problem of Inter-American Organisation*, 1941.

Pan-American Highway, planned in 1924 to connect N. America with the

Central and S. Amer. republics. Sections completed include those from the Mexican border to Panama and Ecuador to Peru. Lack of funds prevented great progress in 1947-48.



Acme Photo. U.S. Information Service: American Embassy

THE PAN-AMERICAN HIGHWAY IN MEXICO

From this point the road begins to climb to an elevation of almost 9000 feet.

Pan-Americanism, movement intended to bring the Amer. republics into closer association for the promotion of trade, cultural interests, peace, and security. Its fundamental object has no necessary connection with the Monroe Doctrine, but in effect the decisions reached at various Pan-Amer. conferences involve the application of that doctrine in its wider, modern interpretation (see further **MONROE DOCTRINE**). In more recent years U.S. leaders have favoured the inclusion of Canada in the Pan-Amer. system, and the formation during the Second World War of the Canadian-Amer. Defence Board marks the inevitable development of this tendency. The ideal of P.-A. has its origin in the time of Henry Clay (q.v.), but for a number of reasons it made only very slow progress. A serious obstacle is or was the fact that Lat.-America (q.v.) has always had much stronger ties, cultural, moral, and economic, with continental Europe, especially with Spain and Portugal, than with the U.S.A. Secondly the S. Amer. republics for long regarded U.S. foreign policy with deep suspicion. Thirdly there is, even to-day, a difference

in governmental ideals; for, whereas the people of the U.S.A. abhor dictatorships, many S. Amer. states have found them apparently well suited to their stage of political progress. Hence in most Pan-Amer. conferences it has been difficult to discuss political aims from a common standpoint. Fourthly there is a radical difference between the outlook and temperament of the Lat.-Amers. and the Eng.-speaking Amers.: the latter seem to regard the former as indolent, changeable, and unprogressive, while the former, especially the Argentines and Chileans, are prone to regard the N. Amers. as aggressive, materialistic, and irreligious (Allan Nevins, *America in World Affairs*, 1941). It would seem not unlikely that each and all these obstacles have lost much of their force through the common danger to all Amer. states presented by Fascist aggression. See J. B. Lockley, *Pan-Americanism: its Beginnings*, 1920, and *Essays in Pan-Americanism*, 1939, S. G. Inman, *Problems in Pan-Americanism*, 1921; and bibliography of **PAN-AMERICAN CONFERENCES**.

Pan-American Union. In 1890 an International Union of Amer. Republics was convened to organise the pub. of comprehensive commercial data in a bulletin issued monthly in the four languages of England, Spain, Portugal, and France. From this beginning there grew the P.-A. U. in 1911 at a congress in Buenos Aires. The stated objects of the union are to develop inter-republic commercial and diplomatic relations and to organise co-operation in communications, customs, etc. A library was estab. called the Columbus Memorial Library, which contains 70,000 vols. The widening scope of the work of P.-A. U., and the creation of specialised inter-Amer. agencies, made it clear that greater integration was required, and accordingly the ninth international conference of Amer. states, held in 1948, adopted a charter of the organisation of Amer. states. Membership comprises the twenty-one Amer. republics on a basis of equality, and its aims are accomplished by sev. bodies, as follows. An inter-Amer. conference meets every five years. The ministers of foreign affairs meet to consider urgent or common problems, assisted by an advisory defence committee. The council of the organisation, with one representative of ambassadorial rank, supervises progress either directly or through technical organs, i.e. the Inter-Amer. Economic and Social Council, the Inter-Amer. Council of Jurists, and the Inter-Amer. Cultural Council. The permanent and central organ of the organisation, housed in Washington, is the P.-A. U., which acts as a permanent secretariat and as a clearing-house for information. Specialised conferences deal with technical matters or specific questions of co-operation, and specialised organisations are estab. to fulfil specific functions in their particular fields of action.

Pan-Arabic Movement, or the movement for an Arab union or federation. Arabia proper forms only a small part of

the Arab world, and not even the most comprehensive programme for an Arab union or federation could look to the political unification of this whole area as a practical proposition (see also ISLAM). Moreover the Arabic-speaking countries in N. Africa to the W. of Egypt (Libya, Tunisia, Algeria, and Morocco), down to 1944 held aloof from the current movement for union. But within the E. half of the Arab world, a smaller but more compact group of ters., the peoples of which are not exclusively or even predominantly of Arab origin, have in the course of centuries become thoroughly Arabised, speak Arabic, and consider themselves Arabs. Yet hitherto they have been kept apart by mutual jealousies and suspicions and by the centrifugal force which the geographical peculiarities of the Arabian peninsula have always exerted. Hence the Nejd has never been the nucleus of an Arab state extending beyond the limits of Arabia proper, and only the Umayyad caliphs of Damascus (661-750) succeeded in holding the Arab countries together during the period of their sway, and from 868 their successors had to submit to the existence of virtually independent dynasties in Syria and Egypt. In Arabian hist. it was exceptional for the majority of the Arab countries, which owed formal allegiance to the caliph of Bagdad to be united under a single ruler. Egypt and Syria formed a unit of this kind for some centuries, and the Ottoman Turks, early in the sixteenth century, once more united this region into a single state, though one of Turkish character with its cap. at Constantinople. The scheme of Mehmet Ali (q.v.) to rival the Ottoman caliph was thwarted by the great powers, but, in any case, there existed then no Arab nationalist consciousness such as exists to-day. The origin of the Arab union movement of recent years may be traced back to about 1906, in the growing aversion of the Arabs from Turkish hegemony. Although the positive side of this movement was vague, the existence of a common national feeling in the Arab provs. of the Ottoman Empire was an undoubted fact by 1913, and it had been influenced by the increasing tempo of European nationalism. The experiences of the Arabs during the First World War contributed greatly to strengthening the bonds between them while the Brit. Gov.'s pledge of 1918 to give the Arabs full opportunities of becoming a nation again should have operated in the same direction, but in the result only Syria and Iraq really aspired to unity and in the Arabian peninsula there can, even to-day, be no question of nationalism in the W. sense, while, again, Egypt's independence was founded on local patriotism. The great differences in the standards of civilisation and in economic resources, as well as among the various classes of society in each, formed and still form the main obstacle to union. At the Paris Peace Conference after the First World War the idea of an Arab union was voiced by the Hejaz delegation, against a Syrian movement for local independence. The

settlement of the Arab question after 1918 resulted eventually in the independence of Arabia proper (Saudi Arabia) and the Yemen) and, later, of Iraq and Egypt and, in principle, of Syria and the Lebanon. But many years passed before superficial disagreements, both inside and outside the Arab peninsula, were overcome, or even before the mutual estab. of diplomatic relations. King Faisal (q.v.) of Iraq fostered union between Iraq and Syria, and, since his regime, the desire for Arab unity has been strong in Iraq. The Syrian National party in 1936 embodied in their national pact the same aspiration, to be achieved by a federation of the Arab states. Arab solidarity was also manifested by the joint move of the kings of Saudi Arabia and Iraq, the imam of Yemen, and the amir of Transjordan, in co-operation with the Brit. Gov., to settle the Palestine revolt of 1936. On the eve of the Second World War it seemed as if the first steps towards an Arab union would be the political co-ordination of Syria and Iraq. Egypt, however, joined Iraq as champion of the cause of Arab unity, and took the leading role, for which indeed the country was qualified by reason of its position in the modern Arab literary and cultural revival. This policy was formally approved by Mr. Eden on behalf of the Brit. Gov., and preliminary discussions were held in Cairo. The discussions seemed to point to a strong sentiment in favour of union among the four main protagonists Syria, Egypt, Iraq, and Transjordan. Ibn Saud's attitude remained one of cautious approval as might be expected in view of the special character of his empire, which includes the holy cities of Islam. But the differences of political organisation and status of the various Arab countries seem to preclude any solution more intimate than a loose federation. In the words of Nuri Pasha, Prime Minister of Iraq, an Arab union can become a reality only if the W. powers renounce their privileged position. The new Arab renaissance seems, however, destined to provide a sound cultural basis for future political development. A general Arab conference was held in Alexandria in 1944, attended by gov. representatives of Egypt, Iraq, Lebanon, Saudi Arabia, Syria, Transjordan, and Yemen, and a representative of the Palestinian Arabs. From this resulted the Alexandria Protocol which suggested an Arab league, a covenant establishing this body being signed in March 1945. The object of the league is the co-operation of its members in political, economic, social, and cultural matters, and its organisation comprises a council, sev. special committees, and a permanent secretariat. Provision is made for the evolution of the league into a closer form of union, and for the inclusion of other Arab countries as these achieve independence. It has to be admitted, however, that the solidarity of the League did not stand the strain of the war in Palestine which resulted in Israeli independence. There was much vocal encouragement of the Arabs of Palestine but military aid was restricted to the

Transjordan Frontier Force and to Egyptian troops; whilst little, if any, co-operation was shown in solving the serious problem of absorbing the great number of Palestinian Arab refugees. (See under **PALESTINE**.) See C. Hourani, 'The Arab League in Perspective' in *Middle East Journal*, vol. 1., 1947; M. V. Seton Williams, *Britain and the Arab States: a Survey of Anglo-Arab Relations, 1920-1948, 1948*; and G. K. Kirk, *A Short History of the Middle East, 1948*.

Panars, see under **JAINTIA HILLS**.

Panathenaea (*Παναθηναία*), most famous of Athenian festivals, was celebrated in honour of Athena, the patron deity of Athens, and is said to have been originally named only *Athenaea*, and to have first received the name of P. at the time when Theseus united all the inhab. of Attica into one body. Claiming to have been founded by Erechtheus as a religious ceremony, it afterwards included horse races, chariot races, and gymnastic sports, as well as torch races and musical contests (introduced by Porcides), and consisted of two feasts, the lesser P. and the greater P., the former of which was celebrated every year and the latter every fourth year. The great P. was the festival and occupied some days, the culminating point being the twenty-eighth day of the month, the birthday of the goddess, when the grand procession carried through the city the costly embroidered peplos or stato robe of Athena. This procession is vividly represented in the well-known frieze of the Parthenon.

Panax, genus of shrubs and trees (family *Araliaceae*) with ornamental pinnate or digitate leaves, and umbels of cream, green, or white flowers. See **GINSENG**.

Panay, is. of the Philippines, bounded on the W. by Mindoro Sea and on the E. by Iloilo Strait. It has an area of 4446 sq. m., and is mountainous and well watered. The chief industry is agriculture, sugar, rice, and copra being the staple crops, but cotton, corn, chocolate, pepper, bananas, mangoes, pineapples, coffee, and tobacco are also grown in large quantities. Jap. forces occupied P. from May 1942 until March 1945. Iloilo (pop. 46,000) is the largest tn. Pop. 301,700.

Panaha Tantra, or **Panchatantra**, see **BIDPAI**.

Panchayat, elective committee among the Parsees which manages secular affairs. In Madras the Ps. are vil. committees whose chief duty it is to attend to sanitation.

Panch Mahals, dist. of India in the N. div. of Bombay, with an area of 1606 sq. m. Timber is exported, and rice and pulses grown. Chief tn., Godhra. Pop. 330,000.

Panaras, St., Phrygian Christian who was martyred in Rome at the age of fourteen. The date of his martyrdom is uncertain. He was buried in the cemetery of Calepodius in Rome, and his head is preserved in the Lateran Basilica. His cultus was very widespread in Europe in the Middle Ages. Pope St. Vitalian in the

seventh century sent relics of the saint to one of the A.-S. kings, and thenceforward St. P. became very popular in England. His feast is kept on May 12.

Panchromatic Photography, see under **PHOTOGRAPHY**.

Pancreas, long, narrow, racemose gland composed of two kinds of tissue. In man the P. lies behind the stomach, the larger end lying within the bend of the duodenum, and the narrow end in contact with the spleen. The cells of one kind of tissue are similar to those of the parotid gland and secrete the pancreatic juice containing trypsin, which converts proteids into peptones, some of which it breaks up into leucine and tyrosine; a ferment amyllopsin, similar to ptyalin, which converts starch into sugar, chiefly maltose, but partly dextrose (glucose); and another ferment, lipase, saponifies and emulsifies the fats. These digestive juices are poured into the duodenum at the middle bend, together with the bile; they are viscid and alkaline, due to the presence of sodium carbonate. The cells of the second kind of tissue form the is. of Langerhans, and their secretion contains insulin (from Lat. *insula*, an is.), which is important in carbohydrate metabolism. If the P. be removed, the amount of sugar in the blood increases and some is excreted in the urine, as in diabetes mellitus, a disease in which the carbohydrate metabolism is disturbed. If the pancreatic duct be severed from the duodenum and exposed so that pancreatic juice is liberated external to the body, carbohydrate metabolism remains normal. This is evidence of the control of this metabolism by an internal secretion of the P. which thus functions as an endocrine organ as well as a digestive gland. The function of the cells of the is. of Langerhans may be impaired or even destroyed by lesions, fibrosis, and degeneration, but in some cases of diabetes mellitus no visible change in these cells takes place (see **DIABETES; GLAND; INSULIN**).

Pancreatitis.—Inflammation of the P. usually proceeds from the ducts, and is sometimes associated with catarrh of the stomach, bile ducts, and duodenum, and with the formation of gall stones. The chronic form is accompanied by fever, loss of weight, anaemia, abdominal pains, jaundice, large pale stools, sugar in the urine, and the pancreatic reaction. It is characterised by glandular atrophy and growth of connective tissue, and yields to rest, diet as prescribed for diabetes, regulation of the bowels, and internal antiseptic treatment by calomel, butter-milk, etc., in early stages. In later stages surgical operation is resorted to, the gall being drained either into the large intestine or, by means of a drainage tube, outside, thus lessening the catarrh of the duodenum. Acute pancreatitis shows much more violent symptoms; with collapse, nausea, and vomiting, sudden acute colic in the upper abdomen, and a tense and swollen condition of that part, and fever. Death supervenes on the third or fourth day, unless operation and drainage are resorted to. It is of three types: (1)

hæmorrhagic, (2) gangrenous, (3) suppurative, with abscess formation; fat necrosis is observed in the substance and surface of the gland. The gangrenous form is regarded as an advanced stage of the hæmorrhagic form and results from the infection of the P. by bacteria which disintegrate the tissues.

Panda, or **Bear-cat** (*Ailuropus fulgens*), mammal of the raccoon family (*Procyonidae*) and almost exclusively vegetarian. It is found only at a height of about 10,000 ft. in the S.E. Himalayas. Its total length is about 30 in. The thick fur is rich chestnut or rusty red on the upper parts and black on the limbs and under part. The face has white markings, and the long bushy tail bears a series of indistinct reddish-brown rings. The feet have large semi-retractile claws, and the animal applies nearly the whole of the sole of the foot to the ground in progression. The Giant P. (*Ailuropus melanoleucus*, is allied to the bears; it is a rare animal of E. Tibet, where it was discovered by Père David. Five Giant Ps. brought to England from W. China by Mr. Floyd Smith in 1938 were the first Ps. ever to reach England alive. One went to the Continent, another to New York, and three to the London Zoo. Ming, the sole survivor in 1944 of the five, *d.* in the London Zoo on Dec. 25, 1944. Valued at £2000, she was the rarest and most valuable animal in the gardens. Little is known about the giant P. in its natural state, beyond the fact that bamboo leaves are its natural food.

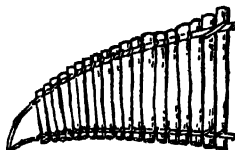


PANDA

Pandanus, genus of evergreen tropical shrubs and trees, with simple, narrow, strap-like leaves which are often variegated, and dicious flowers, followed by globular or oblong fruits. The flowers of *P. odoratissimus* are said to yield attar of roses. Numerous species, especially those of dwarf habit, are grown in the stovehouse.

Pandean Pipes, or **Syrinx**, early form of musical instrument, consisting of a series of reeds or pipes of graduated length fastened together, which when blown

across produced the different notes of the scale. It still survives in some countries, but is of no artistic value in composition, the nearest approach being Mozart's use of an instrument of the type playing five notes from G to D in *The Magic Flute*.



PANDEAN PIPES

Pandects, see **JUSTINIANUS, FLAVIUS ANICIUS**.

Pandemic, see under **EPIDEMIC**.

Pandharpur, tn. of Bombay Prov., India, on the Bhima, 38 m. from Sholapur. It is a popular pilgrims' resort, containing a famous temple to Vishnu. Pop. 30,000.

Pando, dept. of Bolivia, adjoining Brazil, in the N.W., is a low-lying area. Cobijsa is the cap. Area 32,405 sq. m. Pop. 18,600.

Pandora, in Gk. mythology, name of the first woman. Zeus, out of revenge against Prometheus, who had stolen fire from heaven, caused a woman to be made, who, by her charms and beauty, should bring misery upon the human race. The gods endowed her with powers, and called her P. or 'All-gifted.' She brought from heaven a box containing every human ill, upon opening which they all escaped and spread over the earth. Hope alone remaining. Later the box is said to have contained blessings for the preservation of the human race, but when opened these blessings escaped. See Hesiod, *Works and Days*, lxxxi. seq.

Pandulf (d. 1226), bishop of Norwich, b. in Rome. He was sent as papal legate to England in 1211 and 1213 to negotiate with King John, and was also present at the conference of Runnymede in 1215. He received the see of Norwich in 1218, and until his retirement in 1221 exercised much power as legate.

Panæas, see under **BANIAS** and **CESAREA**.

Panegyric (Lat. *panegiricus*), writing or public oration in praise of some person or achievement. Hence the word has come to be applied to anything said or written in a highly laudatory manner of someone or something.

Panel Beating, process used in sheet-metal work, to shape the sheet metal for duct work and trunking. Accuracy is essential, especially in the assembly processes such as welding, when heat tends to distort the lines. Machine fabrication is rapidly taking the place of hand-work.

Panel Heating, system of low-temp. heating in which small pipes are placed below the surface of walls and ceilings, or beneath flooring, and hot water circulates through them at a temp. of from 70° to 130° F. For complete safety, P. H. should be thermostatically controlled.

Panel Walls, walls which fill the spaces between the vertical and horizontal framing members of a structure. They are constructed of a fire-resisting material such as bricks or concrete, and usually comprise two skins or walls. The outer one must be impervious, to keep out moisture, and the inner one pervious to absorb the moisture given off by the occupants of the room.

Panelling, covering of a surface in a building, such as a door, ceiling, or wall, with panels, i.e. sunken or raised compartments, usually framed at the edges. They may be of stone, plaster, or wood. Ceiling plaster panels often most ornately moulded, were a common form of interior decoration from the sixteenth to the nineteenth century, while Wren popularised for a time the use of stone and marble P., much favoured by 17th-century Renaissance craftsmen. Wood has been a favourite material for P. since the late Middle Ages. As a type of mural decoration, wood-P. was first used in England in the fifteenth century, solid wood being used. The joiner working in solid wood had always to allow for the limitations placed upon his work by his material. Both the design and construction of Ps. were determined by the nature of the wood. In Tudor times panels were small and unjointed, set in a close framework of stiles and rails, which were all grooved. The panels were set in dry, in expectation of the inevitable shrinkage. In the seventeenth century, when soft woods and scantlings appeared, the design changed to allow for the introduction of large panels, developing into the long Palladian oblong, bolder and simpler mouldings replacing the elaborate detail of earlier times. The influence of Robert Adams reduced the eighteenth century P. to more modest proportions: plain white or cream paint became the chief decoration on Ps., and the moulding was even simpler. But, throughout, the method of construction remained essentially the same: that of a framework grooved and rabbeted to conceal the unavoidable movement in the panels, so that, at worst, it was only necessary to paint or polish the margin that shrinkage would expose along the arris on the stile or rail framing the panel. In modern times, however, the commercialisation of plywood (q.v.) has led to entirely new methods of construction, and, because of its lower costs, to a much wider use of P. Plywood boards in Gaboon mahogany are now mass-produced at a size of 65 in. by 183 in., so that very large plywood panels are frequently used. The shrinkage in plywood is negligible, and mostly confined to end grain shrinkage: the modern designer's chief concern is therefore the concealment of butt and heading joints, since the minutest crack produced by such joints would otherwise be visible on the polished surface given by modern veneering (q.v.), which is the most popular form of panel finishing to-day.

Pangani, tn., dist., and riv. of E. Africa, in Tanganyika Ter. The Indian Ocean borders the dist. in the E. The tn., 32 m. S. of Tanga, is on the riv. (which is called

Ruvu near the mouth); much of its former importance has been lost. Sisal, coconuts, and sugar are grown in the dist. In 1933 work was begun for a hydro-electric station at the P. Falls. Pop. of tn. 3000.

Pange Lingua, opening words, used as the name, of two famous hymns. The earlier, *Pange lingua gloriosi praelium certaminis*, treats of the Passion of Christ, and is ascribed to Venantius Fortunatus, and by some to Claudian Mamertus (fifth century). It is in the accented unrhymed verse of the period. The other and more popular hymn, *Pange lingua gloriosi corporis mysterium*, treats of the Eucharist and was written by Thomas Aquinas (thirteenth century). It is in rhymed verse and is notable for the theological precision of Aquinas as well as its triumphant swing, imitated from the earlier hymn. There are also lesser known hymns beginning P. L.

Pangeusis, see under HEREDITY.

Pangermanism (Ger. *Pangermanismus*), movement which developed in Germany during the latter half of the nineteenth century, with the intention of encouraging a greater economic and political unity between the Ger.-speaking peoples and those countries under Ger. influence, i.e. Austria-Hungary, Holland, Luxembourg, Flen., Belgium, and Switzerland. An impetus to P. was given by the success of Ger. arms in the Franco-Prussian war of 1870, and from this derived two movements called *Einiges Deutschland* and *Grossdeutschland*. Later these were welded into one society, the *Alldescher Verband* (1890). The political aspect of the First World War was an emphatic expression of P. The alliance with Turkey was the outcome of pangermanist theories, having for its ideal the extension of *Mittleuropa* to include Constantinople. The so-called Flen. movement during the Ger. occupation of Belgium, which aimed at dissociating Flen. Belgium from the remainder and bringing it under closer Ger. influence, was also in accordance with P. So too was the Ger. policy in Poland: it was proposed to give that country autonomy, but only under Ger. supervision. With Germany's defeat in the war and the dissolution of the empire into federated states, the scheme of *Mittleuropa* collapsed and the disintegration of the Austro-Hungarian Empire seemed to have given P. its death-blow. But it was revived in all its worst features under Hitler, who was brought up in the atmosphere of Austrian P. and permanently influenced by it. Bismarck, though a protagonist of P., advocates the political integrity of Austria and the 'little German' solution of the national question in Germany. Hitler, however, discarded the limitations on P., and, from one annexation after another, proceeded to engulf most of Europe. See also NEW ORDER.

Pangin, alternative name of Nova-Gôa cap. of Iba (q.v.).

Pangkor, or Pankur, see under DINDINGS.

Pangolin, or Scaly Ant-eater (*Manis*), genus of edentate (toothless) mammals, found in Africa, India, Ceylon, Java,

Borneo, China, and Formosa. There are about seven species. They are lizard-like in appearance, and, with the exception of the muzzle, sides of the head, throat, chest, and belly, are covered with scales. They vary in length, according to species, from 1 to 3 ft., exclusive of the prehensile tail, which is about twice as long as the body. The head is small with a tapering muzzle. The lower gums of the mouth form two thickened horny ridges separated by a groove along which the cylindrical worm-like tongue slips in and out. The feet are strongly clawed, especially on the third toe of the fore foot, which is used in burrowing and in climbing. The extreme tip of the tail is free from scales and padded with thick skin. The protection afforded these animals by their scales is



PANGOLIN

supplemented by a powerful stench emitted by the entire surface of the skin. The single genus (*Manis*), which contains all the *Ps.*, may be divided into two groups, distinguished both by geographical distribution and certain convenient but not very important external characteristics. In the first or Asiatic group are three species *M. javanica*, ranging from Burma through Java to Borneo; *M. australis*, found in China, Formosa, and Nepal; and the *M. pentadactyla* or the common Indian *P.* found over the whole of India and Ceylon. In the African group are the long-tailed *P.* (*M. macrura*), which has a tail nearly as long as its body, the white-bellied *P.* (*M. tricuspis*), the short-tailed *P.* (*M. temminckii*), and the giant *P.* (*M. gigantea*)—both the last two species have their tails covered entirely with scales. Two specimens of *Temminck's* (named from Konrad Jacob Temminck, 1778-1857, one-time keeper of the Leyden museum of natural hist.) *P.*, which is confined to the savannah regions of E. Africa, were received by the Zoological Gardens in July 1949. *Temminck's P.* is a terrestrial species, as is also the giant *P.*, unlike the two W. African species *M. macrura* and *M. tricuspis*, which are arboreal. It grows

about as big as a medium-sized pig and has a much broader and shorter tail than the other species. With its bony overlapping scales, which protect it against carnivorous animals, the *P.* is probably quite safe from them when it rolls up into a ball. Its natural food consists of ants and termites; but the terrestrial species is much easier to feed than is the arboreal, which seem almost impossible to keep in captivity. The young *Ps.* are carried about on the mother's tail.

'Panhandle State,' see WEST VIRGINIA.

Panicum, genus of grasses which includes two Brit. species and a large number of tropical ones, the most important of which is *P. miliaceum*, millet (*q.v.*).

Panipat, decayed tn. in the Karnal dist. of the E. Punjab, India, on the Grand Trunk Road, some 50 m. N. of Delhi. It is celebrated in legend and hist. as the scene of many great battles and is said to have been one of the pledges demanded from Duryodhana by Yudhishtira as the price of peace in the war which forms the theme of the national epic, the *Mahabharata*. In modern times the plains of *P.* have thrice been the scene of battles, which have settled the fate of Upper India: in 1526, when the greatest though not the last of the Muslim invaders of India, Baber, the son of the Mongolian descendant of Timurlan, came through the passes from Kabul at the invitation of the Muslim governor of the Punjab in rebellion against Delhi and with only 10,000 men defeated the immense army of Ibrahim Lodi, and by securing the mastery of the N. plain confirmed the Muslims in possession of the Mogul Empire, in 1556, when Baber's grandson Akbar, on the same battlefield, reassured the claims of his family by defeating Hemu, the Hindu general of the Afghan Sher Shah, who had driven the heirs of Baber from the throne of the Mogul Empire for a brief period; and finally on Jan. 7, 1761, when Ahmad Shah Durrani, ruler of Afghanistan, having taken and plundered Delhi (1754), met a great Maratha (or Mahratta) army and routed it with such overwhelming slaughter (the death-roll of combatants and camp-followers is said to have been reckoned at nearly 200,000) that the power of the Marathas was completely broken for at least a generation. The site was once used as a manoeuvring ground for Brit. camps of instruction. The tn has manu- of cotton cloth, metal ware, and glass. Pop. 37,800.

Pan-Islamism is a term applied to organised Muslim hostility to the threat of Christian domination of the Muslim world. With some of its protagonists, Islamic Brotherhood, *El Ukhwa el Islamiya*, always a fundamental doctrine of the Muslim faith, has been used to promote the idle political dream of an All-Islamic federation. *P.-I.* has been assisted in its activities by the institution of the 'Hajj' or the pilgrimage to Mecca and by the caliphate, and perhaps of the two the Hajj was the more potent. Every year 100,000 pilgrims meet at Mecca, constituting virtually an annual Pan-Islam congress, and the leaders of

the militant bodies have here discussed plans for Islam's defence and propaganda. Manifestations of the hostile spirit of Mohammedanism to the Christian, and indeed to all other religious communities, occurred in Algeria with the Kabyle insurrection of 1871, the Mahdist rising in the Egyptian Sudan ending with Kitchener's capture of Khartoum at the end of the nineteenth century, while echoes reverberated in Central Asia, Afghanistan, the Dutch E. Indies, and India. The most active centre of activity was that of the Senussi order focused in Jowf, in the heart of the Libyan Sahara. Its influence was general throughout Arabia and N. Africa. The Senussi, however, although powerful, are not bellicose, and attached more importance to establishing unity among the Muslim world first, by development of oases, the building of better houses along caravan routes, promotion of trade, etc. Their power, however, was utterly broken after the First World War by Gen. Graziani after he had conquered Libya for the It. Fascists. During the First World War P.-I. necessarily curtailed its programmes, but the Turkish sultan, as holder of the now defunct caliphate (an institution which implied the political communion of all Muslims under one head) declared a *jihād* (Holy War) on the Allies, a declaration which utterly failed of its purpose, for, in that war, Islamic Arabs and Indians fought against Islamic Turks. When Atatürk (q.v.) abolished the caliphate the centre of P.-I. passed to the Arabs of the Arabian Peninsula. When peace had been declared strenuous efforts were made to quicken the advance of P.-I. Outbreaks in Iraq required strong military measures by the Brit. Gov., and in Persia a similar threat of widespread action by Muslims of that country was only checked by the energetic nature of Gen. Dunsterville's campaign. With a view to restoring the caliphate a caliphate congress was held in Cairo and an All-Muslim congress in Mecca, in 1920, and the names of King Hussein of the Hejaz and Ibn Sa'ud were put forward for the post, but no practical decision was reached. There has in fact been no united Pan-Islamic empire since the early days of the caliphate, and the obstacles to its restoration to-day are far greater than those which stand in the path of the Pan-Arabic (q.v.) movement. Apart from the very natural economic programme of recovery of land, mines, forests, railways, etc., conceded to foreign powers, P.-I. to-day is really nothing more than a useful spiritual weapon in the Islamic people's struggle for national freedom. See also under ISLAM. For its development in the First World War see Sir V. Chirol, *India in Travail*, 1918; H. M. Hyndman, *The Awakening of Asia*, 1919; and L. Stoddard, *The New World of Islam*, 1921.

Panizzi, Sir Anthony (Antonio) (1797-1879), prin. librarian of the Brit. Museum, b. at Brescello, Italy. In 1822, having conspired against the gov., he fled to England. Here he made many acquaintances,

including Brougham, who secured him, in 1831, an assistant-librarianship at the Brit. Museum. He became keeper of printed books in 1837 and prin. librarian in 1857. He was in the first place responsible for the catalogue of books, and was the originator of the great domed reading-room. He was created K.O.B. in 1869. The services he rendered to students in connection with the organisation of the library have been universally recognised. The library, however, was not his only interest, for he was a keen politician, and used all his influence to further the cause of the liberation of Italy. See C. Brooks, *Antonio Panizzi, Scholar and Patriot*, 1931.

Pani, see OXUS.

Pankhurst, Emmeline (1858-1928), Eng. feminist leader, b. in Manchester, daughter of Robert Goulden, calico-printer and early advocate of woman-suffrage. At thirteen she went to school in Paris, and made friends with the daughter of Henri Rochfort. In 1879 she married Richard Marsden P., lawyer, and they served on the committee that promoted the Married Women's Property Act. Five years a Manchester Poor Law Guardian, in 1892 she left the Liberals and joined the Independent Labour party. Widowed in 1898, she became registrar of births and deaths at Chorlton-on-Medlock, forming the Women's Social and Political Union in 1903. From 1906, as a 'militant', she was frequently arrested, and in 1913 sentenced, in connection with the blowing-up of Lloyd George's house at Walton, to three years' penal servitude. When the First World War broke out Mrs. P. went recruiting in the U.S.A. and visited Russia in 1917. She joined the Conservative party in 1918. Her statue was erected in Victoria Tower Gardens, London. She pub. *My Own Story* (1914). See Sylvia Pankhurst, *The Life of Emmeline Pankhurst*, 1935.

Her daughter Sylvia Estelle P. (b. 1882) was also a member of the suffrage movement, and in 1921 received six months' imprisonment for seditious pubs. She also worked for Abyssinian independence. Her works include *The Suffragette Movement* (1931) and a life of her mother (1935). Another daughter, Christabel (b. 1880), was a worker in her mother's cause, after 1918 devoting herself to a religious movement; in 1936 she was created D.B.E. Panna, important tn. in the Bundelkhand dist., Central India, 105 m. N.E. of Jabalpur, is built of stone quarried from the neighbourhood. Pop. 12,000.

Pannonia, prov. of the anc. Rom. Empire, bounded on the N. and E. by the Danube, on the W. by the mts. of Noricum, and on the S. reaching a little way across the Save. It received its name from the Pannonians, a race of doubtful origin. The Rom. arms were first turned against them by Augustus in 35 B.C. An insurrection took place in 12 A.D., which Tiberius crushed after a long struggle; and a much more formidable one of the Dalmatians and Pannonians together in A.D. 6 was suppressed by Tiberius and Germanicus, but not till A.D. 8. Here-

upon the Pannonians settled in the more N. countries, which received their name. The country was now formed into a Rom. prov., which was secured against the inroads of the Marcomanni and Quadi by the Danube, and on its other frontiers had a line of fortresses. Military roads were constructed by the conquerors, who also planted many colonies in the country. Great numbers of the Pannonian youth were drafted into the Rom. legions, and proved, when disciplined, among the bravest and most effective soldiers of the imperial army. P. was subsequently divided into Upper and Lower P. Upper P. was the scene of the Marcomannic war in the second century. In the fifth century it was transferred from the W. to the E. empire, being afterwards given up to the Huns. After Attila's death, in 453, the Ostrogoths obtained possession of it. The Longobards under Alboin made themselves masters of it in 567, and relinquished it to the Avars upon commencing their expedition to Italy. Charlemagne brought it under his sceptre. In the reigns of his successors, the Slavonians spread northward, and the country became a part of the great Moravian kingdom till the Magyars or Hungarians took it at the end of the ninth century.

Panompeng, or Panompenh, see PANOM-PENII.

Panorama, originally constructed by Robert Barker, an Irish artist (1739-1806) living in Edinburgh, who exhibited a water-colour picture of Edinburgh (1788) on a cylindrical canvas 25 ft. in diameter. The name applies to such pictures and to those revolving on cylinders. The *diorama* is a variation invented by Daguerro and Bontou, viewed by direct and reflected light, and giving a more glowing effect. Barker showed a P. of 90 ft. in diameter in a specially built room in London (1793). Robert Fulton in 1797 carried the idea to Paris, and Ps. became popular on the Continent. Prévost painted 'Tilait' viewed at Montmartre by Napoleon (1810) Battle pictures by Langlois of 'Navarino,' 'Moscow,' 'Pyramids,' and 'Malakoff' were exhibited at the Champs Elysées. The 'Siege of Paris' and Ps. of the Franco-Ger. war were shown in the two countries. Scenes from the civil war in the U.S.A., Niagara (1890), and Jerusalem (1891) were exhibited in London.

Panormus, see PALERMO.

Panslavism, movement for the union in polity and culture of all the Slav races, in which Russia has naturally taken the lead as the great political representative of these races. The movement began about 1830, and the spread of the national spirit in Europe at this time considerably strengthened it. A congress was held at Prague in 1848, to which most of the Slav races sent representatives. In the sixties Russia used P. as an instrument of tsarist imperialism, for strengthening the Russian hold on Poland and the Ukraine, and for furthering Russian aspiration in the Balkans and in the Austrian empire. The congress held at Moscow in 1867 was, however, less successful than the Prague

Congress, for, not unnaturally, the fear had grown that the movement was becoming no more than an instrument for the aggrandisement of Russia. In the old tsarist days Russia's pan-Slavist policy was directed mainly against the Habsburg monarchy. The Czechs were chief adherents of P. among the W. Slavs, while the Poles, oppressed by tsardom, were its prin. opponents. The movement also affected the Russo-Turkish war of 1877 and the Balkan war of 1912-13. The chief value of the movement was in the revival of interest in folk-literature, stimulated by Jan Kollar, who was the representative writer of P., but ceased on Slavonic reciprocity appearing in 1836. Tolstoy came to regard the Slav folk-lore as the purest form of literature, although he never actually joined the Slavophil group of writers. Those latter believed it right for the Slav people to leave 'the task of governing to its rulers, while retaining its intellectual freedom to disapprove of what was done amiss.' This justification of the existing order was obviously out of sympathy with the increasing revolutionary theories, and, with the downfall of the tsarist regime and the triumph of the revolution, P. for a time ceased to be a practical force. Mutual inter-Slav sympathies have frequently been invoked since then, but in practice they have been of little avail in face of dissensions among the Slav peoples, such as the Polish-Russian and Serbo-Bulgarian conflicts. To day the traditional pattern of P. reasserts itself, and schemes for E. and central European federations are regarded in Moscow merely as a new version of the Habsburg monarchy, with its centre of gravity in Warsaw instead of Vienna. Following the Second World War Russian foreign policy was concentrated on a deepening *cordon sanitaire* of sovietised states on her W. border as a counterpoise to the 'Western democratic bloc.' In effect this policy was nothing less than P. used as an instrument of soviet aggrandisement and imperialism. See R. W. Seton-Watson, *The Southern Slav Question and the Hapsburg Monarchy*, 1911; A. Fischel, *Der Panslavismus bis zum Weltkrieg*, 1919; D. J. Oallin, *Russia and Post-war Europe*, 1943; and J. R. Deane, *The Strange Alliance*, 1947.

Pansy, or **Heart's-ease** (*Viola tricolor*), dainty Brit. plant, common on arable land, and wholly or in part the origin of the numerous and beautiful garden varieties which have all been introduced since the beginning of the nineteenth century. Violets or tufted Ps. are partly derived from *V. cornuta* of the Pyrenees. The production of flowers is encouraged by removing faded flower heads. Propagation is usually by cuttings or division of plants.

Pantagraph, see PANTOGRAPH.

Pantagruel, see RABELAIS.

Pantaleon, Jacques, see URBAN (popes), Urban IV.

Pantellaria (anc. Kossyra), volcanic is. situated in the Mediterranean to the S.W. of Sicily. The vine, olives, and sub-tropical fruits are grown, and the mt.

slopes are covered with forests. Sheep are reared in the valleys. Pop (1939) about 9000. Cap., P., which has a convict prison. Though strongly fortified P. did not long hold out against allied attacks delivered in 1943 simultaneously with the final conquest of Tunisia. Initial attacks were by forces of fighters and light and medium bombers (May). On June 7 Wellingtons and Flying Fortresses reinforced a daylight assault and a naval blockade. Cruisers and destroyers bombarded the Is. sev. times between May 30 and June 8. Though isolated by that time, the exhausted garrison refused to surrender. Air attack was then redoubled, and on June 10 there were over 1500 sorties of planes which dropped the same number of tons of bombs. Next day a powerful force of cruisers and destroyers began a bombardment, quickly followed by another great air raid, while at mid-day the troops put off in assault craft towards the shore. The Lt. commander then surrendered. Under the 1947 peace treaty P. is to be demilitarised.

Panthalops. see CHURCH.

Pantheism (Gk. *pán*, all, and *theós*, God), name given to that system of speculation which, in its spiritual form, identifies the universe with God, and therefore may be called *acosmism*, and, in its more material form, God with the universe. It is only the latter kind of P. that is logically open to the accusation of atheism; the former has often been the expression of a profound and mystic religion. The antiquity of P. is undoubtedly great, for it is prevalent in the Hindu civilisation, the oldest known in the world. Yet it is a later development of thought than Polytheism, the natural instinctive creed of primitive races; and most probably it originated in the attempt to divest the popular system of its grosser features, and to give it a form that would satisfy the requirements of philosophical speculation. Hindu P. as *acosmism* is taught especially by the Upanishads, by the Vedānta and Yoga philosophies, and by those poetical works which embody the doctrines of these systems, for instance, the Bhagavad Gītā, which follows the Yoga doctrine. Hindu P. is purely spiritual in its character; matter and (finite) mind are both alike absorbed in the fathomless abyss of illimitable and absolute being. Gk. P. originated in the same way as that of India. The philosophy of Anaximander the Milesian (611-c. 547 B.C.) may be described as a system of atheistic physics or of materialistic P. Its leading idea is, that from the infinite or indeterminate, which is 'one yet all,' proceed the entire phenomena of the universe, and to it they return. Xenophanes of Colophon (b. sixth century B.C.) is the first classical thinker who promulgated the higher or idealistic form of P.—'casting his eyes wistfully upon the whole heaven, he pronounced that nuty to be God.' It is often extremely difficult, if not impossible, to draw or to see the distinction between the P. of the earlier Gk. philosophers and sheer atheism. But the most decided and the most spiritual representatives of this

philosophy were the 'Alexandrian' Neoplatonists, in whom we see clearly, for the first time, the influence of the E. upon Gk. thought. The doctrines of Emanation, of Eo-tasy, expounded by Plotinus (A.D. 204-70) and Proclus (410-85), no less than the fantastic Demonism of Iamblichus (d. c. 330), point to Persia and India as their bp. During the Middle Ages speculation was held in with tight reins by the Church, and we hear little of P. The scholastic system, culminating in the synthetism of Aquinas, necessarily excluded P. as repugnant to the simplicity and transcendence of God. Almost the only philosopher of this period who tended towards pantheistic views is John Scotus Erigena (c. 817-c. 877), who is regarded as the only link between ant. and modern P. Modern P. first shows itself in Giordano Bruno, burned at Rome for his opinions in 1600. The universe in his eyes is, properly speaking, not a creation, but only an emanation of the infinite mind. Spinoza comes next among pantheists; his system is based, like the geometry of Euclid, on certain definitions and axioms, and he claims to have given it as conclusive and mathematical a demonstration as the latter. The prin. result at which, after a long, firm-linked chain of reasoning, Spinoza arrives is that there is but one substance, infinite, self-existent, eternal, necessary, simple, and indivisible, of which all elements are but modes. This substance is the self-existent God. In Germany, with the exception of Kant, the three greatest philosophers of recent times—Fichte, Schelling, and Hegel—have all promulgated systems of a thoroughly pantheistic and ideal character. Neither England, France, nor America has produced a single great pantheistic philosopher, but there is an immense amount of vague pantheistic sentiment in the poetry, criticism, theology, and even in the speculative thinking, in these and all European countries in the present age. This is attributable to the ravages made by biblical criticism, and the impact of the physical sciences on religious beliefs. See also METAPHYSICS; MOVISM. See G. Weissenborn, *Vorlesung über Pantheismus und Theismus*, 1859; C. E. Plummer, *The History of Pantheism*, 1878; F. Paulsen, *Der moderne Pantheismus und die christliche Weltanschauung*, 1906; and J. A. Picton, *Pantheism*, 1914.

Pantheon (from Gk. *πανθεῖον*, temple to all the gods), temple erected at Rome in A.D. 123 by Hadrian to replace the previous P. of M. Vipsanius Agrippa (erected 27 B.C.), which had been destroyed by lightning. It is the best preserved and most noble specimen of Röm. architecture (q.v.). It is now used as a Christian church.

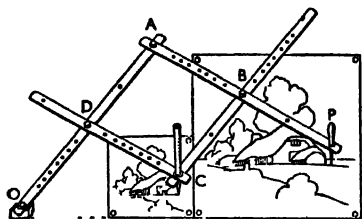
Panther, see LEOPARD and PUMA.

Panther-cat, see OCELOT.

Panticapœum, see KERCH.

Pantin, tn. on the Canal d'Ouroq in the dept. of Seine, France. It is a suburb of Paris, and has extensive dye works, glass works, tobacco and chemical factories, and sugar refineries. Pop. 37,700.

Pantograph, instrument used for making exact copies of a plan or drawing on a larger or smaller scale. The commonest form is made as follows. Four rods are joined together as in figure at points A, B, C, and D, so that ABCD forms a parallelogram, and so that OD = DC and OB = BP. The instrument is pivoted at O, there is a tracing point at P, and a



PANTOGRAPH

pencil at O. The tracing point is then moved over the drawing to be copied, and by the pencil at C a smaller reproduction of the drawing is made at the same time. If the drawing is to be enlarged, the tracing point is placed at O and the pencil at P. Since the points D and B can be moved up and down the rods at pleasure, all positions can be arranged for.

Pantomime, among the ancients, denoted not a spectacle but a person. The Ps were a class of actors who acted their parts only in dumb show. The date of their first appearance in Rome cannot be ascertained; probably the *histriones* brought from Etruria to Rome in 364 B.C. were Ps., but the name does not once occur during the republic, though it is common enough from the very dawn of the empire. Augustus showed great favour to this class of performers, and is consequently supposed by some writers to have been himself the inventor of the art of dumb acting. The class soon spread over all Italy and the provinces, and became so popular with the Roman nobles and knights that Tiberius reckoned it necessary to administer a check to their vanity by issuing a decree forbidding the aristocracy to frequent their houses, or to be seen walking with them in the streets. Under Caligula they were again received into the imperial favour, and Nero himself acted as a P. From this period they enjoyed uninterrupted popularity as long as paganism held sway in the empire. As the Ps. wore masks no facial mimicry was possible, everything depended on the movements of the body, and it was the hands and fingers chiefly that spoke. The subjects thus represented in dumb show were always mythological, and consequently fairly well known to the spectators. The dress of the actors was made to reveal, and not to conceal, the beauties of their person, and as, after the second century, women began to appear in public as Ps., the effect of the æsthetic costume was conducive to immorality; sometimes these pantomimic actresses

appeared quite naked before an audience. It was quite natural, therefore, that pantomimic exhibitions should have been denounced by the early Christian writers, as they were even by pagan moralists like Juvenal.

In modern usage P. denotes not the performer but the piece performed, the character of which nowadays is described under **HARLEQUINADE**. The Christmas P. or harlequinade has now become an essentially British entertainment. It was first introduced in this country by a dancing-master of Shrewsbury named Weaver in 1702. One of his Ps., entitled *The Loves of Mars and Venus*, met with great success. The arrival in London, in the year 1717, of a troupe of Fr. pantomimists with performing dogs gave an impetus to this kind of drama, which was further developed in 1758 by the arrival of the Grimaldi family, the head of which was a posture-master and dentist. Joseph Grimaldi, the son of the dentist, was clever at inventing tricks and devising machinery, and *Mother Goose* and others of his harlequinades had an extended run. At that time the wit of the clown was the great feature, but now the chief reliance of the manager is on scenic effects. See also RICH, JOHN. See R. J. Broadbent, *A History of Pantomime* 1901, C. W. Beaumont, *History of Harlequin*, 1926, and A. E. Wilson, *Christmas Pantomime*, 1934, and *The Story of Pantomime*, 1944.

Pantopoda, see PYCNOGONIDÆ.

Pantshen Lama, see under LAMAISM.

Panzer, see TANKS.

Paolo di Dono, see UCCELLO.

Paolo Veronese, see VERONESE.

Papoting, see CHINGYUAN.

Papacy (Medieval Lat. *Papatus* from Lat. *papa*), position of the pope or bishop of Rome, with reference to its claim to be the head and centre of unity of the whole Christian Church. W. Christendom is broadly divided into two sections, of which one admits the claims of the P., while the other emphatically denies them. According to the Rom. Catholic belief the P. owes its origin to Christ Himself, who gave to St. Peter the primacy of the Church (see especially Matthew xvi 18, 19, Luke xxii. 31, 32), and it is claimed that at the Council of Jerusalem he occupied this position (Acts xv). St. Peter ultimately came to Rome, where he lived and died as bishop of the Church in this place. His powers and office as primate of the Church were handed on to his successor, and so the office has been handed down to the present day. It is however, important to notice that the powers are attached to the office itself. The bishop of Rome is elected, and the peculiar papal powers are his in virtue of his being the successor of St. Peter in the case of Rome. By the end of the fourth century the papal supremacy was generally recognised, in a theological but not in a political sense, and Leo I. (440-461) may be considered as the first of the popes to exercise his jurisdiction on a large scale. The acceptance of his famous *Letter or Tome* at the Council of Chalcedon (451) was in itself a great step. Gregory the Great (590-604) shows the

political and economic side of the Rom. administration. He was responsible for sending Augustine and forty monks to convert the A.-S. (597) and for the planning of two archiepiscopal sees in England, viz. Canterbury and York. He kept in close touch with the Frankish kings, whose help was continuously sought, in the centuries that followed, as a defence against the Lombards. The temporal sovereignty of the Rom. see estab. itself gradually as the Rom. emperor's authority, represented at this period by an Exarch living in Ravenna, grew weaker and weaker, and civil administration at Rome devolved more and more on the bishop. The grant of the papal states was made by Pepin in 753 to Pope Stephen II., Pepin having himself conquered them from the Lombards. A fresh epoch in the hist. of the P. is marked by the coronation of Charlemagne as emperor by Leo III. (800), when the imperial name was revived. During the ninth and tenth centuries the conditions of things at Rome deteriorated. The pope became the mere puppet of conflicting political parties, and the papal prestige reached its lowest point. Reform, largely urged on by the great monastic orders, began in the eleventh century under Leo IX., acting under the guidance of Hildebrand. Hildebrand himself came to the papal throne as Gregory VII. (1073-85), and his vigorous campaign on behalf of the freedom of the Church was eminently successful, accompanied as it was by a moral reformation. The only Englishman to become pope, Nicholas Breakspear, reigned as Adrian IV. (1154-59). For a time the papal power continued to increase and expand until it reached its culminating point in the pontificate of Innocent III. (1198-1216), whose actions and success against King John of England is alone sufficient to demonstrate this. After this comes a decline. The conflict between Pope Boniface VIII. (1294-1303) and Philip IV. of France as to the power of the state to tax the Church ended in the victory of the Fr. monarch. About this period the popes lived relatively little in their own city, but travelled much in their states. The influence of the Fr. king was seen in the election of a Frenchman as Pope Clement V. in 1305. Partly owing to this influence and the disturbed state of Italy, he took up his residence in the little state of Avignon. Here he and his successors who were Frenchmen were subject to the strong influence of the Fr. king, and as this period lasted over seventy years (1309-76) it has come to be known as the 'Babylonian captivity.' It did much to lower the prestige of the P. in N. Europe, and as the P. also fell heavily into debt through the extravagance of Peter Roger, Clement VI. subsequent papal policy was marked by heavy and correspondingly unpopular taxation. In 1377 Gregory XI. returned to Rome at the entreaty of Catherine of Siena, and on his death an It., Urban VI., was elected. His harshness led to a revolt of the cardinals who proceeded to elect Robert of Geneva, who took the

title Clement VII. So occurred the great schism, as each party continued to elect a successor when their claimant died. Europe had the spectacle of two or more popes reciprocally fulminating anathemas. During this period the spirit of nationalism which assisted in the Reformation largely increased. The great schism was healed by the Council of Constance (q.v.) (1414-1418). The result of all this was that the General Council became stronger than the popes, and the fifteenth century is marked by struggles between the two authorities. The Reformation led to an internal reform of the P., which was roused to grapple with the situation. The outstanding papal reformer was the Dominican, Pope Pius V. (1566-72). The Council of Trent (q.v.) (1545-63) is the great monument of the reform movement that arose in the Rom. Church. The seventeenth century saw the growth and expression of the principles of Gallicanism (q.v.), and the eighteenth century was also one of severity to the P., owing to irreligion and atheism especially rife in France. At the end of the century Pius VI. was deposed from Rome by the revolutionaries, and a little later Pius VII. was forcibly removed to France by Napoleon. The latter by introducing the Code Napoleon into the papal states, worked a change which proved irrevocable, and the following years were marked by constant revolutionary and anticlerical activity. The latter half of the nineteenth century, during the pontificate of Pius IX., saw a revival of papal influence in every country in Europe. The period is also one of great importance in the internal hist. of the P., for at the Vatican Council of 1870 the dogma of papal infallibility was promulgated (see INFALLIBILITY), simultaneously with the end of the temporal power of the popes, consequent on the occupation of the city of Rome by Victor Emmanuel. From that date until 1929 the pope remained a prisoner in the Vatican and the state of hostility between the new rulers of Italy and the pope over the confiscated papal states was known as 'the Roman Question.' The period of the pontificates of Pius IX. (1846-78) and Leo XIII. (1878-1903) is one of the greatest in the hist. of the P.

The P. is considered by Rom. Catholics to be part of the divine ordinance for the government of the Church, and those Christians who do not submit to the jurisdiction of the pope are regarded as outside the communion of the Catholic Church. The pope, as head of the Church, occupies the position which Christ would occupy were He still on earth, and is, therefore, the vicar of Christ, from whom immediately he derives his jurisdiction. The Vatican Council defined that 'when the Roman pontiff speaks *ex cathedra*, that is, when he, using his office as pastor and teacher of all Christians, in virtue of his apostolic office, defines a doctrine of faith or morals to be held by the whole Church, he, by the divine assistance promised to him in the person of blessed Peter, possesses that infallibility with which the Divine Redeemer was pleased to invest

his Church in the definition of doctrine on faith or morals, and that, therefore, such definitions of the Roman pontiff are irrefragable in their own nature and not because of the consent of the Church.' Moreover it defines that the pope has supreme disciplinary power over the whole Church, a power that is 'ordinary and immediate over all and each of the pastors and of the faithful.' Rom. Catholics are careful to point out the numerous limitations which form part of each of these decisions. In the first case the infallibility does not include the pope's expressions of opinion on matters of science, or on the morality of any specific act, or his private opinions even on matters of faith. Again the pope's immediate authority over each of the faithful is not allowed to diminish episcopal jurisdiction.

During the present century the political situation in Italy has given rise to frequent divergence of opinion between the P. and the state. During the First World War Pope Benedict XV. (q.v.) issued an unsuccessful encyclical calling upon the warring nations to come to terms of peace, but refrained from condemning either side. The advent of Fascism in 1922 brought an altogether new approach to the position of the Church in Italy. Civil measures imposed by the ruthless methods of Mussolini brought the two parties often into open hostility, and Benedict's successor, Pius XI., was by no means prepared to submit to Fascist measures, which were calculated to weaken the position of the Church in Italy. After prolonged negotiation, characterised at first by stubborn refusal by both sides to give way, the Lateran Treaty and Concordat was agreed between the pope and Mussolini in 1929. By this treaty the pope resigned all claim to the papal states, except the Vatican area, in return for a recognition of his sovereign status, certain privileges, and compensation.

Before 1939 when the political situation in Europe became overclouded the pope issued appeals for peace, and throughout the war reiterated appeals were broadcast by the Vatican radio. In 1940 Pope Pius XII. condemned the brutal treatment of the Polish people by the Gers. and the Nazi persecution of religion in Poland, denounced the total war launched by Germany as 'a pitiless war of extermination conducted in defiance of the laws of war,' condemned the Ger. invasion of the Low Countries, and attacked the Nazi doctrine of racialism as opposed to man's equality in the eyes of Christianity. In June 1940 the pope came to an agreement with the It. Gov. on the Vatican's status in wartime, and later he instructed all apostolic nuncios and other papal diplomats abroad, most of whom were It. nationals, to take out Vatican citizenship so as to acquire greater freedom of action during the war. In a broadcast to France in March 1941, the pope strongly condemned the Nazi repudiation of Christianity and at the end of that year, in a Christmas broadcast, laid down the

principles for a lasting peace. In the autumn of 1943 when the allied armies were advancing on Rome the Gers. purported to take the Vatican 'under German protection.' Since the war a conflict between the Vatican and the U.S.S.R. has been waged by propaganda and open hostility in the countries of Europe dominated by the Soviet, notably in Poland, Hungary, and Czechoslovakia. The highest point of this campaign was reached in the imprisonment of Cardinal Mindszenty, primate of Hungary, in March 1949.

The Election of the Pope.—The pope is elected by the Sacred College of Cardinals (see CARDINAL). After the pope's death the cardinals enter a conclave, holding no communication with the outside world until a new pontiff is elected. The usual means is by secret ballot, two-thirds majority being required, but unanimous acclamation is recognised as well as delegated election by a committee of three, five, or seven cardinals. The power of veto, once exercised by Christian princes, especially the emperor, has been totally abolished. The secrecy of all transactions in the conclave is secured by oath and severe penalties. The new pope may be of any nationality. If not already a bishop he is consecrated, and afterwards crowned, from which ceremony he dates his pontificate. The insignia of the pope are the pallium and the tiara or triple crown.

See L. von Ranke, *History of the Popes* (Eng. trans.), 1908; Dr. W. Parr, *Papacy in Modern Times*, 1913; and J. W. C. Wand, *History of the Modern Church*, 1931; also L. F. A. von Pastor, *Geschichte der Päpste seit dem Ausgang des Mittelalters* (1886-89; Eng. trans., ed. by F. I. Antrobus, *The History of the Popes from the End of the Middle Ages* (29 vols.), 1891-1938); M. Creighton, *History of Papacy*, 1897; W. Barry, *The Papal Monarchy*, 1902; H. K. Mann, *Lives of the Popes in the Early Middle Ages* (18 vols.), 1910-32; *The Cambridge Medieval History* (ed. by J. B. Barry and others), 1911-26; M. I. M. Bell, *A Short History of the Papacy*, 1921; J. Carrere, *Le Pape* (Eng. trans.), 1924; Canon D. Bashaw, D.D., *The Threshold of the Catholic Church*, 1925; F. Heywood, *History of the Popes*, 1931; D. Attwater, *A Dictionary of the Popes*, 1939; and M. Deansley, *A History of the Medieval Church* (4th ed.), 1947.

Papadiamontopoulos, Joannis, see MOREAS, JEAN.

Papagavos, see TREBUANTEPEC WINDS.

Papal States, see CHURCH, STATES OF THE; VATICAN CITY.

Paparesci, Gregorio, see INNOCENT (popes), Innocent II.

Papatoetoe, tn. of New Zealand, 12 m. from Auckland. It is now a rapidly expanding residential area, a feature being 30 ac. of improved playing areas. The first local authority was a highway dist. formed in 1862, followed by a tn. dist. in 1919, with a pop. of 1171. The dist. was formed into a bor. in 1946, when the pop. had grown to 3800. The pop. in Feb. 1949 was 4440.

Papaver, the poppy, genus of ann. or perennial plants (family Papaveraceae), a number of which are valuable garden plants. The Shirley Ps. are selected varieties of the common corn or red P. (*P. rhæas*). *P. orientale* includes some very showy varieties, varying in colour from white to scarlet. *P. somniferum*, the opium poppy, bears large white flowers with a purple stain at the base of each petal. There are many handsome garden varieties.

Papaveraceae, family of herbaceous plants or shrubs, most of which have a milky narcotic juice. There are usually two concave petals which are early deciduous. The petals are commonly in multiples of four. The fruit is globose, capsular, opening by pores, or pod like, opening by valves. The genera include *Meconopsis*, *Eschscholzia*, *Glaucium*, and *Chelidonium*.

Papaw Tree (*Carica papaya*), small tree (family Papayaceae), with a branchless stem bearing green flowers followed by a large, oblong, orange yellow fruit, which is cooked and eaten by the natives before it is ripe. The juice of the ripe fruit is made into sauce, and is said to have the property of making tough meat tender on account of the presence of papain. It is found in Queensland, in sev. is. of the Pacific, the Malabar coast of India, Ceylon, Burma, and the Malay States.

Papeete, or **Papeiti** ('little water'), cap. of the is. of Tahiti, on the N.W. coast, at the mouth of the R. P. It is the chief port and trading centre of the is., and is situated on a beautiful harbour protected by a reef. It has a cathedral. Pop. 8500 (of whom about half are Fr.).

Papen, Franz von (b. 1879), Ger. politician: b. at Well, Westphalia. In 1914 he was Ger. military attaché in the U.S.A., but had to leave the country on account of his complicity in plots to blow up Amer. munitions factories. He later became chief of the general staff to the Turkish Army in Palestine. In 1921 he entered the Prussian Landtag as a member of the Catholic Centre party. He organised an aristocratic group, known as the *Herrenklub*, in Berlin, which in 1932 prevailed on Hindenburg to appoint an authoritarian gov. of noblemen under P. as chancellor of the Reich, acting, at the same time, as commissary for Prussia. P. helped Hitler to power by organising a conference at the house of Schroeder, a Cologne banker, at which strong political and economic groups of the right agreed to support a National Socialist gov. By 1933 P. was vice-chancellor under Hitler, but in 1934 he began to oppose him. Hitler's answer was to shoot P.'s closest collaborators in the 'blood bath' of June 30, 1934, but P. was not molested. He continued to serve Hitler, and was sent on various diplomatic missions, and as minister to Austria he prepared the notorious *Anschluss*. During the Second World War he was minister to Turkey. Indicted as a war criminal at the Nuremberg trial (q.v.), he was one of three to be acquitted but was arrested by a Ger. court and sentenced under the denazification laws to eight years' detention in a

labour camp, with confiscation of property and loss of rights. An appeal secured his release and loss of rights.

Paper. The making of P., as we know it, is quite a modern development, little less than 150 years having elapsed since the invention of a machine for making P. in bulk was given to the world by a Frenchman, Nicolas Robert. In early times written communications and records were inscribed on clay tablets, leaves, and waxed surfaces of wood or metal. The next stage was reached when the Egyptians used their ingenuity and skill in the manuf. of papyrus by unrolling and flattening out the thin layers forming the stem of the papyrus reed. The skins of animals were next pressed into service, and used in the form of vellum or parchment, but this being of necessity a costly and limited production, it occurred to a Chinese named Tsai-Lun in the year A.D. 105 that it would be possible to produce a writing surface from vegetable fibres beaten to a pulp and made into sheets by a felting or interlocking of fibres. This early production, it is said, was made from bark, tow, and old nets. Before this a P. had been made from silk pulp by pounding small waste pieces of silk, this being of course an expensive method, and wood was also used at about the same period. The Arabs in the eighth century learned the craft from Chinese prisoners, carrying on what they were shown. Thus the Chinese were making very good quality, thin, hard-sized writing Ps. (even dyed various colours) in the third and fourth centuries, whereas the Arabs, and later the Egyptians, were making only very poor quality brown Ps., and no fine writing Ps., such as the Chinese had made, even in the tenth century. The Moors, who at one time had sev. P.-mills in Fez (Morocco), during their occupation of Spain introduced the art into Europe, making P. in Valencia and Toledo in the eleventh century. At the same time it was also introduced into Fabriano, in Italy, by people returning from the crusades. Fabriano has continued to be a great P.-making centre, and the mills there are to-day among the leading mills in the world. Water-marking was first invented there. In 1390 a P.-mill was set up by Strumer in Nuremberg, and, in order to safeguard his methods of production, he compelled his men to take an oath under penalty of death that they would keep secret his processes. No record of Eng. manuf. is met with until we come across, in Wynkyn de Worde's *De Proprietatibus Rerum*, printed in 1495 at Caxton's Press, mention of a P.-mill at Stevenage in Hertfordshire, kept by one John Tate. Caxton used Tate's P., with a seven-star wheel type of water-mark, in 1495. In 1588 a ten years' licence was issued by Queen Elizabeth to Spielman to make P. at Dartford in Kent, from which time until the present day some of the finest P. has been made in that co., one of the most famous mills being that of James Whatman, started at Maidstone in 1769. The method of manuf. in these early mills was practically the same

as that in use in the making of 'hand made' P (i.e. P such as is used for bank notes, good account books, drawing Ps, etc.) at the present day. The rags were carefully cleansed, boiled, beaten into pulp, and mixed with water to the consistency of cream. A finely woven wire mould or sieve, sufficiently open to permit the water to fall through but leave the pulp fibres on its surface, was dipped into the vat of creamy liquid and sufficient pulp taken up to make one sheet. In order to felt or interlock the fibres a peculiar horizontal joggling motion was given to the mould while the water was draining away. The resulting sheet or 'water leaf' was placed between sheets of woollen material. After being subjected to great pressure the sheets were hung up



Ballick Paper Mills
PAPER MAKING BEATERS

to dry, and then sized with animal size (made from pieces of skin gristle and sometimes bones) and finally dried and surfaced by pressure rollers. The only difference made in these processes at the present day is one of better implements and better finishing apparatus.

A new departure was made in 1799, and the first machine for producing P in bulk more rapidly and cheaply in England was set up in a small mill at Boxmoor in Hertfordshire early in the nineteenth century by Fourdrinier. The development was fairly rapid and by 1850 at least 150 of Fourdrinier's machines were in use. Until about 1860 little addition to the varieties of P of cloth or fibre was made, but the repeal of the P duty in that year caused such an increased demand for printing surfaces that new material other than woven stuffs had to be found. A fine fibre was found by Routledge's experiments with esparto grass which grown in Spain and N. Africa, could be easily shipped to this country, and after passing through the boiling, beating and bleaching processes gives fibre of about 50 per cent of its weight. Many other vegetable fibres have been adapted to the use of the P maker during the last seventy years, among them, recently, bamboo which has been very closely investigated, and though

there are certain difficulties in regard to its conversion to pulp it is of such rapid growth and is so widely cultivated that it is likely to be a P making fibre of the future. The largest consumption is that of wood pulp. There are two kinds of pulp produced from wood viz mechanical pulp the result of a tearing and grinding of the logs and the production of a coarse fibre suitable for use in the manufacture of newspaper and chemical pulp which is produced by the melting out, by use of acids and sodas of all but the necessary fibre the resulting material being used in the manufacture of various types of printing Ps. Nowadays Ps are usually made not merely of one fibre but of combinations of rag esparto and wood the proportions varying according to the quality wanted in the result. The introduction of machines for making the P besides creating demands for fresh fibres and pulps, of necessity revolutionised all the old processes which had been sufficient when each sheet was made by hand. The pulp after beating and mixing with water is turned on to a wire mould but in this instance the mould or sieve becomes an endless band of wire gauze kept moving by rollers and joggled from side to side by special arrangements to effect the felting or interlocking of the fibres. Rubber 'duck' strap at the sides hold the pulp in the gauze. Finally a 'dandy roll' is used which is a copper wire cylinder used for the purpose of impressing into the P what is known as a water mark. After this it is led on blanketing round a succession of drying cylinders heated by steam and finally reaches the finishing or glazing rolls and is then (unless it is required in reels) chopped into sheets. These machines must have been small affairs at first but necessity in the guise of rotary printing machines has caused them to grow in strength, size and number to feed the capacious maw of a modern newspaper printing press. There are many machines in existence turning out huge rolls 240 in wide and carrying a continuous web of P at the rate of nearly 12 m of P approximating 6 tons in weight per hr. The necessity for the cheap provision of a fine printing surface for use with the 'half tone' process block has resulted in the production of a variety of so called 'art Ps' which depend for their surface on a coating of china clay and other minerals. Imitation art Ps loaded with china clay in their manufacture are also used for half tone work. In their best form they certainly lighten the printer's work and so cheapen the cost of production but they are anything but conducive to long life or permanence for the beautiful work which is being done at the present time. It is quite possible to do without them and to use a pure P, highly calendered which will it is known, last for centuries but the cost being about twice as much permanence has to be sacrificed to cheapness. There is a cylinder coated P, which is used quite extensively for magazine work but, unlike the art P the coating is applied by means

of rollers or cylinders on the same machine on which the P. is made; this considerably reduces the production cost. An enormous variety of Ps has been called into being by the demands of the modern printer, publisher and other consumers. The demand for lightness and great bulk has encouraged the manufacture of a soft fluffy P. known as 'feather weight', and made to produce a fat looking book which contains only a comparatively small number of pages. The wavy 'deckle edge', natural to hand made Ps, can be artificially produced on machine made Ps. A committee of world experts drawn from librarians and P manufacturers has put on record the P 'furnish' required for books which have permanent value. One of the chief causes of the use of inferior P is

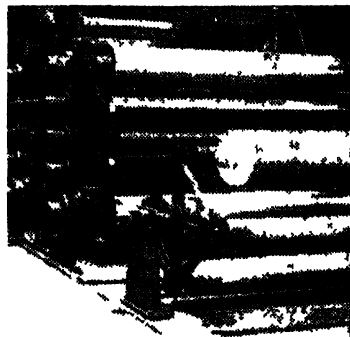
In the U S A there is a similar (though different) range of standard sizes known by area measurement but not by name. World output of P. is enormous—over 20,000,000 tons a year—of which quite half is turned out by the U S A. Canada is the next biggest producer.

See C. F. Cross and E. J. Bevan, *Text Book of Papermaking*, 1900. J. Beveridge, *Paper Makers' Pocket Book*, 1901, 1911; R. W. Sindall, *An Elementary Manual of Paper Technology*, 1906. E. Sutermeister, *Modern Pulp and Paper Making*, 1921; E. A. Dawe, *Paper and its Uses*, 1929; R. H. Clapperton and W. Henderson, *Modern Paper Making* 1939, and D. Hunter, *Papermaking* 1948.

Paper Money. The paper bank-note is now the main currency in the United



RETURNING PAPER MACHINERY
PAPER MACHINE WET END



ROLLING PAPER MACHINERY
FINISHED PAPER END

the necessity for providing the printer with a material which he can immediately put on the machine without the old time-consuming preparation of damping, etc., necessitated by the sizing of the P. Nowadays what sizing there is done is with resinous compounds, mixed with the pulp in the beating engines, but high grade bank and bond Ps are 'tub sized', a process of sizing which is employed after the P. is made, the webs of P. actually running through a tub of size and gaining strength and durability. P. is sold in reams of 480 to 516 sheets in Great Britain and 500 sheets in the U S A. The more important standard sizes in Great Britain are.

Size	Writings and Drawings	Printings and Cartridges
Imperial	30 x 22	30 x 22
Royal	24 x 19	25 x 20
Medium	22 x 17½	23 x 18
Large Post	21 x 16	—
Demij	20 x 15½	22½ x 17½
Foolscap	16½ x 13	—
Dbl. Foolscap	26½ x 16½	27 x 17
Dbl. Crown	—	30 x 20
Dbl. Large P.	33 x 21	33 x 21
Dbl. Demij	31 x 20	35 x 22½

and multiples of these.

Kingdom and elsewhere. The gold sovereign disappeared from circulation in the First World War and although the gold standard was restored in 1925 there was no restoration of the gold coinage, nor of the right to exchange the individual note for gold at the Bank of England. By Sept 1939 Great Britain had abandoned the gold standard and the gold from the issue dept. of the Bank of England had been transferred to the Exchange Equalisation Account. Thus the £ note, although legal tender, no longer enjoys a gold backing and has become inconvertible currency. Although the Bank of England note is not subject to the limitation in number which gold imposes, the importance of limitation is now fully appreciated and the issue of notes is placed strictly under the control of Parliament. It was not always so. Ricardo wrote in 1817 (*Principles of Political Economy and Taxation*). 'There is no point more important in issuing paper money than to be fully impressed with the effects which follow from the principle of limitation of quantity. It will scarcely be believed fifty years hence that bank directors and ministers gravely contended in our times, both in Parliament and before committees of Parliament, that the issues of notes by

the Bank of England, unchecked by any power in the holders of such notes to demand in exchange either specie or bullion, had not, nor could have, any effect on the prices of commodities, bullion, or foreign exchanges.

Reference to BANKS AND BANKING will show the beginnings of the bank-note. The goldsmith's receipt for coin left in his charge became the earliest bank-note in England (see BANK OF ENGLAND). During the eighteenth century a large number of small private country bankers grew up who issued their own bank-notes, 'promises to pay' which were duly met so long as the bank remained solvent. Many of them failed. The Bank of England note was of a different order. Already accepted in payment of taxes, by 1833 it had been made legal tender; but not before suspending payment of its notes in coin, albeit with the express support of Parliament, for some twenty-four years (1797-1821). The Bank Charter Act of 1844 forbade any further issue of bank-notes not backed 100 per cent by gold and made issues a monopoly of the Bank of England. Apart from three crisis 'suspensions' the bank continued to honour its legal tender 'promises to pay' in gold, right up to 1914. Bank of England notes not backed by gold were known as the fiduciary issue and amounted to £14,000,000 in 1844 and £19,750,000 in 1920, the difference representing two-thirds of lapsed issues of country banks as provided for in the Act. Meantime in the First World War currency notes with no gold backing had been issued in large numbers by the Treasury. These were taken over by the Bank in Nov. 1928, when the fiduciary issue was fixed at £260,000,000. By 1938 Bank of England notes totalled upwards of £500,000,000. In 1939 the transfer of gold from the Issue Dept. made the whole note issue fiduciary. In 1947 this fiduciary issue had risen to £1,450,000,000, falling to £1,300,000,000 in the following year. These large increases in the note issue over the period covered by the two world wars were greatly exceeded in other countries, where inflation proceeded so far as to make the currency unit practically worthless. In Germany between the world wars the almost worthless mark was replaced by the *Reichsmark*. The Fr. franc did not go to such extremes, but in 1949 the £ bought over 1000 francs as against 25 in 1914. Years before in France the gov. of the Revolution had made an unsuccessful experiment in P. M. based on land, i.e. *assignats* (q.v.), representing land which might be assigned to the holder of the note, and later, *mandats* (q.v.). See also BANK OF ENGLAND; BANKS AND BANKING; CURRENCY; ECONOMICS; MONEY; and the bibliographies to these articles.

Paper Nautilus, or Paper Sailor (*Argonauta argo*), genus of cephalopod molluscs which, in the case of females, hold the shell to the body by two dilated specially adapted arms; it is not attached as in other molluscs by a special muscle. The male is much smaller than the female and is shell-less. The female retains her eggs

and hatches them in the shell, which may therefore be taken to have been elaborated for this purpose; it is indeed the only dibranchiate mollusc which secretes an external calcareous covering. The animal swims by ejecting water from its funnel, not by elevating two of its arms as sails in the manner represented by auct. fall. It can also creep on the sea bottom.

Paper Office, see RECORD OFFICE.

Paphlagonia, auct. dist. of Asia Minor, bordering on Bithynia on the W. and washed on the N. by the Euxine. It is a rough mountainous country, but contained some fertile plains in the N. which were rich in olive plantations. It was celebrated for its horses, mules, and antelopes, and the forests in the S. furnished abundance of timber, the boxes of Mt. Cotyrus being famous. The inhab. were probably of Syrian origin, and are mentioned by Herodotus among the races conquered by Croesus. Later they came under Rom. rule. See R. Leonhard, *Paphlagonien; Reisen und Forschungen in nordlichen Kleinasien*, 1915.

Paphos, name of two tns. on the S.W. extremity of the coast of Cyprus, Old P. and New P. The former, now Kukia, was situated on an eminence about 1½ m. from the sea, and was the chief seat of the worship of Aphrodite, remains of whose temple are still extant. The latter, now Baffo, about 7½ m. from Old P., was on the sea and had a good harbour. It was also celebrated for its worship of Venus, and was the administrative cap. of the is. and a flourishing commercial city, famous for its oil and its 'diamonds' of medicinal power.

Papias, bishop of Hierapolis in Phrygia, is known to us from references and extracts made by Irenaeus, Eusebius, and others. Irenaeus says of him that he was 'a hearer of John and a companion of Polycarp,' but Eusebius counters the former part of this statement with a quotation from P. himself. P. is chiefly important for three statements made in the fragments that have been preserved of his *λογισμὸν ἀποστόλων ἐξηγήσεις*, statements which form the basis of all studies on the synoptic problem. In one of these he speaks thus of Mark: 'Mark, having become the interpreter of Peter, wrote down accurately whatsoever he remembered, but without recording in order what was said or done by Christ.' The second reference is to Matthew (see LOGIA). The third is his reference to 'John the Presbyter' presumed to differ from the beloved disciple P. lived in the latter half of the second century, and is usually counted among the Apostolic Fathers.

Papier-mâché, substance produced by pasting together many sheets of thin paper which has been used for many purposes w. a lightness and strength were needed. The practice of making P. is of E. origin. Boxes, trays, bowls, and many other articles were at one time made in this way in great variety, and finished by lacquering and gilding and painting. One of the uses to which it is put in

printing is in the production of the 'fong' or mould, made by pasting sheets of blotting-paper, with a mixture of alum, flour, and starch, on to a backing of brown paper, and finishing the surface with two or three sheets of tissue-paper. An impression is taken by beating, or by hydraulic pressure, from the forme of type by a printer. He then may cast from a die stereotype reproduction of his matter. Its flexibility enables him also to bend it to the necessary form for casting the curved plates used on the printing cylinders of the modern rotary presses.

Papilionaceæ, the only one of the three sub-orders of Leguminosæ which is represented by Brit. species. The flowers are monosymmetric and papilionaceous or butterfly shaped, as for instance in the sweet pea.

Papillon, breed of toy dog which derives its name from the large, erect, spreading ears of the prick-eared variety. It is a smart breed, with small, arched skull, pointed muzzle, and dark eyes. The ears are erect or drooping, according to the variety, the chest is deep, and the back rather long. The coat is long and silky, usually white with black, black and tan, or red markings, but it is sometimes red, brown, or yellow. The tail is long and carried over the back. The maximum height is 12 in. at the shoulder, and the maximum weight is 12 lb. It has become very popular, owing to its intelligence and alertness, and it is comparatively easy to rear.

Papin, Denis (1647-1714), Fr. physicist, b. at Blois, studied medicine in Paris, where he practised for some time as a physician. He became acquainted with Huyghens, and devoted himself to physical sciences. Before P.'s time the intense force which can be generated in water, air, etc., under the action of heat was well known, but he was one of the first to indicate the prin. features of a machine by which this property could be made of practical utility. He became a member of the Royal Society in 1681. While in England, P. and Boyle together repeated their experiments on the properties of air, etc. To P. undoubtedly belongs the distinction of having first applied steam to produce motion by raising a piston; he is also the inventor of the 'safety-valve,' an essential part of his 'Digester.' By this latter machine P. showed that liquids in a vacuum can be put in a state of ebullition at a much lower temp. than when freely exposed to the air. He discovered the principle of action of the siphon, and improved the pneumatic machine of Otto de Guericke. Unfortunately for science P.'s numerous writings have not yet been collected, but many of them will be found in the *Philosophical Transactions*, *Acta eruditorum*, and the *Recueil de diverses pièces*. See life by E. Expouf (4th ed.), 1888.

Papineau, Louis Joseph (1786-1871), Canadian politician and leader of the Fr.-Canadians in the struggle against the Château clique or Eng.-speaking merchant class (so-named from the Château St. Louis, one-time residence of the governors

in Quebec). B. in Montreal, he was a seigneur of good family, handsome, and eloquent. His father had helped to defend Quebec during the Amer. invasion of 1775; he himself had been an officer in the war of 1812, and as late as 1820 he had praised the advantages enjoyed by Fr.-Canadians under Brit. rule. After 1822, however, he became convinced that the Fr. in Canada were threatened with the loss of their rights. In 1809 he was elected to the Legislative Assembly of Lower Canada, and from 1815 to 1837 he was Speaker of the House of Assembly for Lower Canada. P. led a mission to England to protest against the proposed union of Upper and Lower Canada, and led the Fr.-Canadian demand for financial reform and an elected prov. council. The chief weapon of P. and his followers was the power of the assembly to vote taxes, for though the governor had a few sources of revenue like land-granting which were not controlled by the assembly, they were not sufficient for the purposes of government. P. therefore led the Legislative Assembly of Lower Canada in withholding supplies from the governor, and secured the co-operation of Wm. Lyon Mackenzie's revolutionary party of Upper Canada (1835). P. attended a meeting of delegates at St. Charles that decided on rebellion. His complaints were not all justified; in 1834 he and his followers had drawn up an extraordinary document, known as *Ninety-two Resolutions*; some of its protests were fully justified, but generally speaking the document was bitter and unreasonable, and its approving references to the Amer. revolution were unwise. P. lost the sympathy of moderate Fr.-Canadians, and especially of the leaders of the Church, who had no wish to foment rebellion. A warrant was issued against him for high treason. He escaped to Paris, but after a general amnesty returned in 1847 to sit in the United Canadian Legislature till 1851.

Papini, Giovanni (b. 1881), It. author (pseudonym, Gianfaleo), b. in Florence, and largely self-taught. His father was an old It. Liberal and, therefore, atheist and Garibaldian. Among his vols. of essays and criticism are *Il Crepuscolo dei Filosofi* (1906); *La Paga del Sabato* (1915); *L'Uomo Carducci* (1918); *Le Più Belle Pagine di A. Manzoni* (1923); *Dante vivo* (1931); *Italia mia* (1939); *Figure umane* (1940). His poetry includes *Cento Pagine di Poesia* (1915); *Opera Prima* (1917); *Pane Fino* (1926). Novels: *Parole e sangue* (1912); *Un Uomo finito* (1912, autobiography; Eng. trans. 1924). Formerly a sceptic, specially famous through his *Stregonature* (1916), he accepted the Catholic faith while writing his *Storia di Cristo* (1921), which has been trans. into many tongues (Eng. trans. 1923). See studies by B. Palmieri, 1927; A. Viviani, 1931; and M. Apollonio, 1944.

Papinianus, Æmilius Paulus, most celebrated of Rom. jurists, was b. towards the middle of the second century, and during the reign of the Emperor Severus he held the office of Libellorum Magister, and afterwards that of Præfectus Præ-

torio. After the death of Severus, Caracalla dismissed P. from office and caused him to be put to death. P.'s works consist of thirty-seven books of *Questiones*, nineteen of *Responsa*, two of *Definitiones*, and two works, *De Adulteriis* and a Gk. fragment. His high reputation as a jurist was much enhanced by strong moral feeling.

Papinius Statius, see STATIUS.

Papirius Carbo, see CARBO.

Pappus, Alexandrinus, eminent mathematician of Alexandria who flourished about the end of the fourth century. A.D. He was the author of commentaries on the *Elements* of Euclid of which fragments have been preserved by Proclus and others, and of which the section on book 10 has survived in Arabic; also on Ptolemy's *Syntaxis*, of which books 5 and 6 survive (ed. A. Rome, *Biblioteca Apostolica Vaticana*, 1931), and on the *Planisphaerium* of Ptolemy and the *Analemma* of Diodorus. P.'s greatest work, however, is the *Synagoge*, an invaluable collection of mathematical writings and commentaries. This has come down to us complete (ed. F. O. Hultsch, 1876-78).

Pappus, see COMPOSITÆ.

Papua, or Brit-N. New Guinea, is the S.E. part of the Is. of New Guinea with the d'Eutrecasteaux Is., Louisiade Archipelago, and the small Is. between 8° and 12° S. lat. and 141° and 155° E. long. Area 90,540 sq. m. P. lies wholly within the tropics, and has a very irregular and indented coast-line. The S.E. rises to a series of mt. ranges, the highest point of which, Mt. Victoria, attains 13,120 ft. Viewed from the air P. presents a panorama of scores of miles of abrupt hills, gloomy gorges, and sheer escarpments, all shrouded in thick scrub, a monotonous expanse of sombre green darkening to black in the ravines and steep valleys, with very few native vils. and still rarer white settlements. The chief rvs. are the Fly, Turama, and Banno. The rainfall is heavy and evenly distributed except in one belt of land which has a dry season and produces tobacco and cotton. The wetter parts produce a variety of crops, sugar-cane, coco-nuts, sago palm, bread fruit, dyewoods, spices, ginger, and bananas and other fruits. Many minerals occur, gold, copper, tin, lead, zinc, and cinabar, also brown coal and petroleum; gold, silver, and osmiridium are the only minerals exported. Topaz and beryl are the only precious stones. P. imports mainly foodstuffs, tobacco, drapery, and hardware. There are wireless telegraph stations at Port Moresby and Samarai. The races vary in colour, mode of living, and language, and most of the coastal people are not of Papuan origin but are descended from races of more distant parts of the Pacific. They had a reputation for bloodthirstiness among the pioneer settlers, and not without reason. But the tales of cannibalism and murder have undoubtedly been distorted to suit the natural and impressive setting. Gold prospectors blazed the trail and most of the earlier gold-hunters have left their bones to whiten on the slopes of Mt. Scratchley and

the Wharton range, having fallen to attacks by the natives. Raiding by head-hunters, retaliatory blood feuds, and, particularly, sorcery (the convenient term used to include the various forms of magic and necromancy in Papua) have hindered native administration. Many white men have been murdered in past years. In 1901 occurred the massacre of the Rev. James Chalmers and his party by the Goaribari tribe, followed by the Le Hunte punitive expedition, which burned down dozens of *dubes* or native vils. But tribes have in large areas settled down to peaceful habits, while hundreds of the natives are being taught by the many missionary bodies in P.

In order to prevent that portion of New Guinea not claimed by the Dutch from passing into Ger. hands, the Queensland Gov. annexed it in 1883, a step not sanctioned by the imperial gov. In 1884, however, a Brit. protectorate was proclaimed over the S. portion of the E. half of New Guinea, and in 1887 Queensland, New S. Wales, and Victoria agreed to share the cost of administration. The ter. was annexed to the Crown the following year. The Federal Gov. of Australia assumed the control in 1901; the political transfer was completed by the Papua Act of 1905, passed by the Federal Gov., and in 1906 a proclamation declared that New Guinea would be known as the ter. of P. Government is by the usual colonial machinery of executive and legislative councils under an administrator. Jap. forces invaded P. in Dec. 1941. By the capture of Buna by the Allies on Dec. 14, 1942, the invaders were driven out of the country. Pop. (1940): Europeans 1800; Papuans (estimated) 337,000. See also MELANESIA. See A. F. H. Wollaston, *Papuans and Papuans*, 1912; Sir H. Murray, *Papua of To-day*, 1925; I. F. Champion, *Across New Guinea from the Fly to the Sepik*, 1932; E. Cheesman, *The Two Roads of Papua*, 1935; J. G. Hides, *Through Wilder Papua*, 1935; and L. Lett, *The Papuan Achievement*, 1942. See also MELANESIA.

Papules, see PIMPLES.

Papworth Village Settlement, vil. settlement situated on the Huntingdon-Royston road near Cambridge for the rehabilitation of tuberculous victims, the largest of its kind in the world. Begun in 1917 on a nucleus of a few shelters and an old house, it is now a community of some 2000 people who have been helped to health and enabled to support themselves by their own efforts. In addition to two sanatoria, five hostels, and nurses' homes, there are now some 200 houses and five large modern factories employing 700 men and women making for home and export prefabricated buildings, coach-building and joinery products, cabinet furniture, travel goods, printing, book-binding, and upholstery goods. The founder of the settlement was Sir Pendrill Varrier Jones, together with Sir Clifford Allbutt, Sir George Woodhead, Mr. Robert Morant, and others. Much valuable work was done by Sir Fredrick Milner, who was the first chairman.

Although the hospital section of the settlement has been absorbed into the new national health scheme, the hostels, factories, and vil. still retain their individual identity and still require the generous help of the public if its special needs and further development are to be realised.

Papyrology, in the widest sense, is that branch of learning which seeks to decipher and determine the date and place of anything written on papyrus. The oldest books known are written on rolls of papyrus, and the earliest preserved written papyri go back to the fifth Egyptian dynasty (about 2750-2625 B.C.); they are couched in Egyptian language and hieratic writing (see under **HIEROGLYPHIC, HIERATIC, AND DEMOTIC WRITINGS**). Other papyri are written in Egyptian demotic or Coptic scripts, in Aramaic, in Gk., Lat., Persian, or Arabic. The use of papyrus lasted through Gk. and Rom. times down to the early Middle Ages. The middle of the tenth century seems to be the period when its manu. (in Egypt) ceased, but already since the fourth century A.D. in S. Europe, under Christian, Rom., and Byzantine influence, papyrus was gradually displaced for writing books by parchment and vellum.

In the strictest sense of the term, P. indicates Gk. P., and particularly deals with the period in which Egypt was more or less completely under Hellenic influence and Gk. was one of its main languages. The upper limit of this period may be fixed at 332 B.C., corresponding with the conquest of Egypt by Alexander the Great, and the lower limit about two centuries after the Arabic conquest of A.D. 641 when Arabic had definitely triumphed. The reason of this restricted use of the term P. lies in the following facts: (1) The manu. of papyrus was confined to Egypt, and it is most probable that the estab. of the great Alexandrian library led to improvements in its manu., and stimulated production. (2) Although, in the countries bordering on the Mediterranean, papyrus was until the fourth century A.D. the most common writing material, on account of climatic circumstances and because of the damp soil, no papyrus could long survive except beneath the splendid protective covering of the sands of Upper Egypt (some charred papyri have been found in Lower Egypt and in Herculaneum Italy; a few fragments have been discovered in Palestine and in Dura Europos in N. Mesopotamia). (3) The number of the preserved Gk. papyri is estimated at about 30,000. Thanks to them we have at our disposal so many data of so great a variety that there is no region in antiquity of which we know the legal, social, religious, cultural, economic, and domestic life so well as Graeco-Rom. Egypt.

P. is a new branch of knowledge; although the first papyrus brought in modern times from Egypt to Europe (the 'Papyrus Schow' or *charta Borgiana*, now in Naples) reached Europe in 1778, and in the nineteenth century considerable finds were made in various places of the

Fayûm, only in the last decade of that century systematic excavations and research for papyri were organised (W. M. Flinders Petrie on behalf of the Egyptian Exploration Fund, 1890; B. P. Grenfell and A. S. Hunt, of Oxford, 1896). P. is of paramount importance for the study of the Gk. civilisation of Egypt in the following fields: writing, language, public and administrative law, social, economic, and religious life.

See L. Mitteis and U. Wilcken, *Grundzüge und Chrestomathie der Papyrskunde*, 1912; W. Schubart, *Einführung in die Papyrskunde*, 1918; W. M. Flinders Petrie, *Ten Years' Digging in Egypt*, 1923; P. Collomp, *La Papyrologie*, 1927; F. G. Keoun, *Fifty Years of Papyrology*, *Actes du 1^{er} Congr. intern. de papyrol.*, 1938; A. Calderini, *Manuale di papirologia antica greca e moderna*, 1938; W. Perennans and J. Vergote, *Papyrologisch Handboek*, 1942; and M. David and B. A. van Groningen, *Papyrologisch Primer*, 1946.

Papyrus, whence Eng. 'paper,' (Gk. *πάπυρος*, (also *βύβλος*, *βύβλος*, hence Bible). The term P. is of Egyptian origin, meaning 'the growth of the River (Nile).' It is a straight, stout, tall, reed-like, aquatic plant, called in Lat. *P. antiquorum* or *Cyperus papyrus* (q.v.), which in ancient times grew in profusion in Egypt on the R. Nile. It also grew, but in small quantities, in N. Palestine. Nowadays it only grows in Abyssinia and in Sicily, but it is reared as a curiosity in many botanical gardens (also in England, where, however, it needs to be removed under cover in the autumn). Its leafless stem rises from four to fifteen feet above the water, and has an umbrella-like top of delicate green rays. The anc. Egyptians used the stems of this plant to make reeds, mats, sandals, framework of light rowing boats, and for other purposes, but the prin. importance, at least in modern eyes, was the use of P. as writing material. A detailed account of the way in which the P. was treated in the Egyptian 'paper factories' is given by Pliny the Elder (*Naturalis historia*, xiii. 74 ff.), the great Rom. naturalist (A.D. 23-79). A section from the lower part of the stem, the pith, was cut vertically into thin strips; these were laid some vertically and others transversely, pressed together, and dried in the sun. Uneven patches were smoothed or pressed away, and the surface was polished more or less carefully according to the quality to be produced. The sheets were then glued together into a roll. The length of the rolls varied; some were 30 or 40 ft. long, but we are told of some that were 150 ft. long, and would contain the whole *Iliad* or *Odyssey*.

The oldest books known are written on rolls of P., and the earliest preserved written papyri go back to the first half of the third millennium B.C. P. was not only employed for literary purposes. In Egypt, Greece, Rome, Syria, etc., it was for many centuries the chief material used for writing for all ordinary purposes, such as legal documents, receipts, petitions, notices of birth, and official and private

letters. Its employment for these purposes continued until the middle eleventh century, while as writing material for books it was gradually displaced by parchment or vellum, which had superseded it in the fourth century A.D. See PAPER; PAPHYROLOGY; PARCHEMENT; VELLUM.

Par, or Parr, see SALMON.

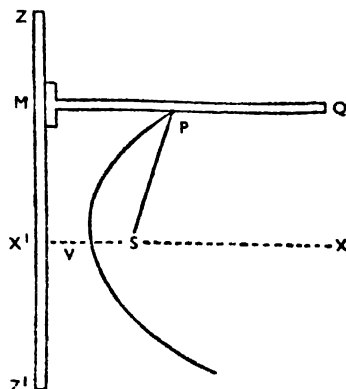
Pará, original name for the R. Amazon, S. America. The name is now applied to the estuary in the P. state of Brazil, popularly described as a mouth of the Amazon. It really belongs to the Tocantins and Anapu R., and is only connected with the Amazon by a tidal 'furo'.

Pará, or Grão Pará, maritime state of N.E. Brazil, bounded on the N. by the Guianas and on the N.E. by the Atlantic. Area 464,780 sq. m. It lies almost entirely in the Amazon basin, and is copiously watered by the Amazon, P., Tocantins, Xingó, Tapajós, and smaller rivers. The higher ground is almost desert. The greater part is still dense forest, but settlements have been made along the rivers, and cacao, sugar, cotton, caoutchouc, Brazil nuts, plantains, rice, manioc, millet, vanilla, etc., are produced. P. produces some of the world's finest rubber, but production has greatly declined. Pop. 1,074,000 for its cap. P., see BELEM.

Parable was originally the name given by the Gk. rhetoricians to an illustration avowedly introduced as such. In Hellenistic and N.T. Gk. it came to signify an independent fictitious narrative, employed for the illustration of a moral rule or principle. This kind of illustration is of E. origin, and admirable examples are to be found in the O.T. and N.T., particularly in the discourses of our Lord. Much of Christ's parabolic imagery is to be found in the writings of Hillel, Shammai, and other great rabbis, as, for example, the Ps. of the Pearl of Great Price, the Labourers, the Lost Piece of Money, the Wise and Foolish Virgins, etc. Among modern writers, the Ger. divine Krummacker greatly distinguished himself in this species of composition. The P. differs from the fable in the probability or verisimilitude of the story itself, and agrees with it in the essential requisites of simplicity and brevity. An excellent work on the Ps. of the N.T. is that by Archbishop Trench.

Parabola, locus of a point P whose distance from a fixed point S, the focus, is equal to its distance from a fixed line ZZ', the directrix (see figure where SP = PM). The figure also shows a simple method of construction; SPQ is a string attached at S and Q and equal to MQ; the T square MQ is moved along the ruler ZZ', while a pencil keeping the string tight and against the T square traces the curve. A line XX' through S perpendicular to the directrix ZZ' is called the axis; it meets ZZ' at the foot of the directrix. The curve is symmetrical to the axis, which cuts it at the vertex V, and extends to infinity, always receding from the axis. The latus rectum or focal width is the chord of curve through the focus S and perpendicular to the axis. The angle SPM is bisected by

the tangent at P, hence the parallel beams from the light in the focus of a parabolic reflector. The curve is a conic section made by a plane cutting a cone in a direction parallel to the generating line and is a special case of the conics governed by the relation $SP = ePM$, e being called the eccentricity of the curve. For the P., $e = 1$. The path of a projectile when not truly vertical is a parabola except for interference of air and other irregularities, the recognition of which fact has been of enormous utility in military matters. In co-ordinate (Cartesian) geometry the equation for a P. in the simplest form, taking the origin at the vertex, is $y^2 = 4px$.



PARABOLA

All curves of the form $ym - pxm$ are classed as Ps.: $y^2 = px$ is the cubical P., $y^2 = px^2$ is the semi-cubical P.—the evolute of the P. of the second degree.

Paraboloid, figure traced by a parabola moving with its vertex always on another parabola, the planes of the two being constantly at right angles to each other. The elliptic parabola is traced when the concavities are kept in the same direction; its plane sections are either parabolas or ellipses. The hyperbolic parabola is traced when the concavities are kept in opposite directions; its plane sections are parabolas or hyperbolas.

Paracatu, tn. of Brazil, in the state of Minas Geraes, 300 m. W. of Ouro Preto. Pop. 12,000.

Paracelsus, or Philippus Aureolus Theophrastus Bombastus von Hohenheim (1493-1541), Swiss physician, b. at Einsiedeln, son of a physician. His education was very irregular. He studied for a time at Basle Univ., and learnt alchemy and chem. from Trithemius, bishop of Wurzburg, and m. surgery and mineralogy at the Tyrol mines, and gained a great deal of information by travelling. He gained some fame as a physician in Basle, and was made tn. physician and a lecturer at the univ.; but many of his opinions, to which

he held with great obstinacy and arrogance, were in opposition to the best contemporary opinion. He was driven from Basle in 1528 through a dispute, and d. at Salzburg. His numerous works were ed. in Gor. in 1589-91 (J. Huser), 1603-5, 1618, 1926-32 (B. Aschmann), and 1944 ff. (J. Strobel); and in Lat. in 1603-5 and 1638. See studies by M. B. Lessing, 1839; F. Murx, 1842; F. Mook, 1876; E. Hartmann, 1887; G. Kahlbaum, 1891; F. Strunz, 1921, 1937; B. S. von Waltershausen, 1936; and I. Betschart, 1941; also F. Oesterle, *Die Anthropologie des Paracelsus*, 1937, and C. G. Jung, *Paracelsus*, 1942.

Paracentric Motion, term used by Leibniz to express the motion which, together with harmonic circulation, made up the entire motion of a planet. It is sometimes inaccurately applied to simple motion about a centre.

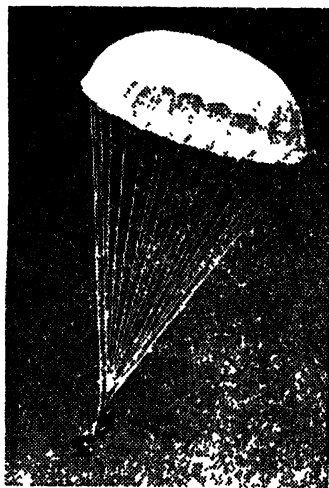
Parachor, in chem., a function used by Sugden and others in the investigation of the constitution of various compounds. The P. of a liquid is given by the ex-

pression $P = \frac{M}{D} \sqrt{\gamma}$, where M = molecular weight, D = density, and γ = surface tension of the liquid.

Parachute (Fr. *chute*, a fall). A device somewhat resembling a gigantic umbrella about 24 ft. in diameter, intended to break a fall from a height. The origin of Ps. is credited to Leonardo da Vinci (1452-1519), whose rough sketch and theory seems to have suggested the design of Fausto Veranzio in *Machina Nova* (1585). Joseph Montgolfier (or Montgolfière) (q.v.) and Blanchard made experiments (see under BALLOONS) in the latter part of the eighteenth century. Montgolfier descending safely with a P. of the umbrella type from a housetop at Annonay. To André Garnerin falls the distinction of being the first man to descend safely in a P. from a balloon, a feat which he accomplished over Paris on Oct. 22, 1797, being no doubt aided by good luck. In its earlier forms the P. was nothing more than a piece of cloth stretched over a rigid frame, but when, after the lapse of a couple of centuries, interest in it is revived, it reappears as a silk parasol with ribs, and is to be found stretched over the top of a balloon open and ready for use. The great problem was oscillation or swaying. Robert Cocking thought oscillation could be cured by the attachment of weights and, with the courage of his convictions, lost his life in 1837 at Lee in Kent in a descent from a balloon in his famous if ludicrous inverted cone. In the following year one John Hampton made a successful descent in an umbrella type of P., 16 ft. in diameter with ribs of whalebone and a canvas covering. One of the most spectacular of parachutists was the celebrated Amer. aeronaut Maj. Thomas Baldwin, who, in the eighties of last century, made a number of successful descents in a simple silk P. carried up under a free balloon. The flexible P. of to-day, in fact, owes its origin to Baldwin. A hole

or vent in the top of the P. was found to be a complete solution to the oscillation problem, and a vent is now made in all Ps. to this day. The First World War provided the first urgent necessity for Ps.

The need for parachuting from aeroplanes brought into being the manually operated P., which is fixed to the man. Since that war America has paid much attention to the subject, and the names of Irvin and Smith are closely associated with the subsequent developments. The first man to make a free drop, or, in other words, to use a manually operated P., was Leslie L. Irvin, at Dayton, Ohio, on April



Central Press Photos Ltd
PARACHUTE

29, 1919, with a parachute of his own design. This jump not only pioneered the use of Ps. in aircraft, but disproved the belief held up to that time that a human body falling through the air would die as a result. It was subsequently proved by a long delayed free drop and the use of a barograph that the terminal velocity of an average man falling through space was approximately 118 m.p.h.

The modern P. has a small pilot-chute fixed to the apex of the main P., by which it is dragged away from the airman to prevent his falling into it. P. are so constructed that they can, when packed, be fastened on to the back or form a seat for the airman. New types of P. are tested by being cast from an aeroplane diving at over 200 m.p.h., with a 400-lb. weight attached to them. Up to 1939 the ordinary P. contained about 80 yds. of the finest pure silk, but owing to the shortage of silk caused by the Jap. conquests in E. Asia, nylon was introduced and has remained the most useful material.

To the function of Ps. as life-savers was

added that of providing a means of landing troops and supplies in otherwise inaccessible areas (see PARATROOPS). For this purpose an adaptation of the manually operated P. was introduced, the P. being opened by means of a static line, i.e. the rip-cord was not pulled by the parachutist but attached to the inside of the aircraft and the P. was torn open when the weight of the falling body came on the line. Supplies in units weighing up to 8000 lb. could also be dropped by this means.

A recent development is the Irving automatic barometric-controlled P. release, a small device strapped to the P. harness and incorporating a barometric capsule and a clockwork release mechanism. It can be set to open the P. at any height, and is chiefly intended for pilots leaving the aircraft at such high altitudes or high speeds that they would be unconscious during the first part of their descent.

See J. E. Hodgson, *The History of Aeronautics in Great Britain*, 1921.

Parachute Troops, see PARATROOPS AND AIRBORNE TROOPS.

Paraclete (Gk. *παράκλητος*, advocate), name given to 12 Holy Ghost which Christ promised his disciples would take his place as their teacher and guide after he left them. Also the name of the monastery founded by Abelard near Nogent-sur-Seine, of which Héloïse was abbess. See also HOLY SPIRIT.

Para-dihydrobenzene, see HYDRO-QUINONE.

Paradise (O.F. *paradis*, Lat. *paradisus*, from Gk. *παράδεισος*, a park or enclosure), word first used in Gk. by Xenophon for a Persian enclosed park or pleasure ground. It occurs sev. times in the O.T., notably in Nehemiah ii. 8, where it is trans. 'forest.' In Christian literature it is used sometimes for the earthly P., the garden of Eden, and sometimes as equivalent to heaven. Sometimes, again, the word is taken, as in Dante's *Purgatorio*, to mean an intermediate state lower than that of heaven, and Luke xxiii. 43 is so interpreted.

Paradise, Bird of, see BIRD OF PARADISE.

Paradise Fish, or *Macropodus viridiventralis*, name given to a domesticated variety of a Chinese species of Osphromenidae known as *Polypterus opercularis*. In colour it is bright gold and green.

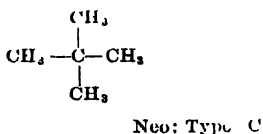
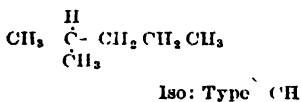
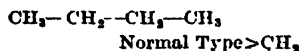
Paradox (Gk. *παράδοξος*, contrary to opinion), term applied to whatever is contrary to the received belief. It follows that a P. is not necessarily an opinion contrary to truth. There have been Ps. which have overthrown accredited errors, and in the course of time become universally accepted as truths, but this, the highest form of P., which is only another name for originality of thought, is rare. The P. which springs from a passion for distinction, and which despises good sense and the lessons of experience, is far more frequent. It may not be a positive error in thought, but it is so exaggerated in expression that if taken literally it actually does mislead.

Paradoxure (Gk. *παράδοξος*, i.e. adj.; 'contrary to received opinion,' + *ουρα*,

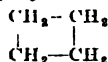
'tail'), animal of the genus *Paradoxurus*, family Viverridae, or of an allied genus; so called because of its remarkably long curving tail. Also called palm-cat, martlet, or civet.

Paraffin, white crystalline body found in coal, wood, and organic tars. It can be obtained by distilling cannel coal at as low a temp. as possible. Melting point 45-60° C., sp. gr. 0.87-0.91. When pure it has no smell or taste and is insoluble in water, but dissolves in alcohol and ether. Chemically it is a mixture of hydrocarbons of the methane series. It is mainly obtained from petroleum and natural oils by the process of fractional distillation. P. oil distils over between the temps. of 150 and 300° C. and is used for illuminating and heating processes. At 300° C. the distillate consists partly of solid and partly of liquid. The solid is P. wax, and is separated from the liquid by filter presses. It is used chiefly in the manuf. of candles. From the chemical point of view the term P. has a wider significance than indicated above. It is assigned to an important branch of organic compounds called the methane series, because P. wax consists principally of its higher members. P. wax is not acted upon by strong acids, alkalis, etc., and thus the name P. (from Lat. *parum affinis*, small affinity) was given to it for this reason. The more important members of this series are the following: Methane (CH₄) boils at -116° C. under 150 atmospheres. This gas is frequently present in decomposing matter and is alternatively known as marsh gas. Ethane (C₂H₆) boils at +4° C. under 46 atmospheres; propane (C₃H₈) boils at 45° C. under 1 atmosphere; butane (C₄H₁₀), boiling point 17° C. under 1 atmosphere; isobutane (C₄H₁₀), boiling point 17° C. under 1 atmosphere. It will be noticed that there is a constant difference of CH₂ in their composition, while they have similar chemical properties. Such a series is called a *homologous series*, this series having the general formula C_nH_{2n+2}, where *n* stands for any positive integer. The fourth member, butane, presents a peculiarity in that there are two distinct bodies possessing the same composition, while they differ in properties. They are distinguished by the two names given, and are represented constitutionally by CH₃.CH₂.CH₂.CH₃ and (CH₃)₂CH.CH₃. Such compounds are said to be *isomeric* (equal measure), the second being called an *isomer* of the other. The number of isomers rapidly increases with the number of carbon atoms in the compound. There are three main types of Ps., known respectively as Normal, Iso, and Neo (given on p. 312), according to the manner of grouping of the carbon atoms.

The boiling points of the isomers are always lower than that of the unbranched series. The P.s. are found in nature as petroleum in the U.S.A., U.S.S.R., Dutch E. Indies, Burma, etc. Some of the lower Ps. occur as natural gas, e.g., in U.S.A., and some are found in the intestinal gases of animals and in the gases given off during the putrefaction of vegetable and



animal matter. The *cyclo*-Ps. are ring compounds, e.g. *cyclo*-butane is



There are certain fractions in the lubricating oil range of petroleum components which are used for purposes other than lubrication. Liquid P. is one of these. Large quantities of fuming sulphuric acid or oleum, that is, sulphuric acid containing excess of sulphur trioxide, are used in refining liquid P., as it is essential that any tendency to form sludge is removed and that no reactive constituents should remain in the final product. The use of these large quantities of sulphuric acid gives rise to the formation of sulphonic acids, and these are removed by neutralisation with caustic soda solution containing alcohol. After neutralisation the oil is treated with decolorising earth and filtered to produce the water-white, odourless, tasteless liquid P.

Paragus, see PALAWAN.

Paraguarí, tn. of Paraguarí, S. America, cap. of the dept. of P., 45 m. by rail from Asunción. It produces tobacco, cotton, and cattle, and there are potteries, tanneries, and distilleries. Pop. 8000.

Paraguay, republic of S. America, with no sea-board, bounded N. by Bolivia, N.E. and E. by Brazil, and S. and W. by Argentina. Topographically P. forms part of the great depression known as the basin of Paraná, whose W. edge is formed by the Andes, and on the E. is bounded by the Brazilian highlands. To the N. rises the sheer edge of the Matto Grosso tablelands of Brazil, and to the S.W. is the Gran Chaco, part of whose vast and partly unexplored ter. forms the W. portion of P. P. has been the 'subject of exaggerated descriptions: on the one hand it has been condemned as a pest-ridden and poverty-stricken land of unbearable tropical climate, and on the other lauded as full of great possibilities and pleasing features. In reality it is a country of contrasts, affording compensating circumstances and varied conditions both of nature and people . . . much of the country merits the description of a natural

garden, where flowers and fruit run riot, even around the thatched, mud-walled huts of the squatters. In certain districts' (C. R. Knock). The area of P. proper (i.e. excluding the Chaco or 'occidental section') or 'oriental section' is officially given as 61,600 sq. m. The Chaco formed the subject of a long-standing dispute with Bolivia and led to war in Sept. 1932, which only ended with an armistice on June 12, 1935, followed by a peace treaty signed in July 1938, the boundary being fixed by arbitration (Oct. 1938). The consequent increased area of P.'s occidental section is officially estimated at 88,788 sq. m., making the total area of the republic approximately 149,770 sq. m. Pop. estimated in 1945 at 1,141,300 (including 53,450 in the Chaco, of whom Indians number 8000). The people of P. are of mixed blood, namely Sp., Indian, or Guaraní, and mestizo (mixed European and Indian), the most predominant being the Guaraní. There are practically no Negroes in P. and the admixture of foreign blood is less than in any of the other S. Amer. republics. The white element, as always, forms the governing class, and the official language is Sp., although the common speech is Guaraní. The Paraguayans are a far less energetic people than their neighbours of Argentina, and modern civilisation progresses but slowly.

P. is bisected by the riv. of its own name. The Paraná flows along its E. border, while the Pilcomayo forms its W. boundary till it joins the P. near Asunción. In the angle formed by the Paraná-P. confluence are extensive marshes, one of which, called Neembuco, i.e. 'endless,' is drained by Lake Ypoa, a large lagoon S.E. of Asunción. E. of the Paraná P. the country has always been known as P. proper, while on the W. and S.W. lies the region of El Gran Chaco. The portion lying within the P. ter. (prior to the treaty of 1938) consists largely of swamp, forest, and jungle, inhabited by semi-civilised Indian tribes, among whom the S. Amer. Missionary Society has long been doing good work. This region is also the haunt of the jaguar and numerous reptiles. There are large areas of good grazing ground, which support many cattle. The N. portion of P. is mountainous, but the S. portion is one of the most fertile dists. in S. America, consisting of hills and gentle slopes, richly wooded, and wild savannahs, and rich alluvial plains, some of which, however, are marshy. Much valuable timber is found in the forests, including hard, soft, and dye woods. The rainfall of P. is sufficient for agric. production, and the climate, though sub-tropical, is agreeable and healthy.

Production.—The whole area of the oriental section of P. is cultivable, the soil affording facilities for meadows and pastures which are capable of a varying agriculture, such as might render the country the orchard and garden of that part of the S. Amer. continent. Only a small part, however, has as yet been brought under cultivation. Stock-raising

is one of the prin. industries, the country being well adapted to it. About one-third of the whole area is devoted mainly to the raising of horses, cattle, swine, and sheep. The cattle number about 4,500,000, and those not used for home consumption are exported in the form of meat extract, preserved meat, and jerked meat, over 100,000 head of cattle being slaughtered annually for this trade. Herds are to be found in most parts of the country, but it is in Misiones, the area N. of Concepción, and in the Chaco that the greater part exist. Agric. methods are primitive. The inadequacy of labour and the backwardness of communications render scientific agriculture difficult. Tractors, modern ploughs, and agric. implements in general are being introduced upon a large scale. Two botanical schools have been opened by the gov. The country is especially noted for yerba maté (strong flavoured Paraguayan 'tea'), a plantation product as well as a natural product of the forests. The leaves of the shrub (*Ilex Paraguayensis*) are stripped, dried in the sun, packed in sacks, and exported. The cost of production is small and the article is sold at less than the price of tea and coffee. During the war with P. the Brazilian soldiers marched and fought day after day without any other sustenance. It is consumed all over S. America, and the output may be as much as 20,000 metric tons, exports ranging from 4000 to 8000 metric tons. Yerba maté wild trees cover nearly 1,500,000 ac.; the acreage under cultivated trees is less than 30,000. Among other industries are timber cutting, fruit growing (tangerines, grapefruit, etc.), petit-grain essence (an essential oil distilled from the leaves of bitter oranges and used for perfumes and flavouring), and tobacco, while maize, manioc, beans, and various cereals are cultivated. Many rare woods are still largely unknown in foreign markets. Among the more abundant woods are cedar, curupay, and lapacho. Cedars and hardwoods are a valuable article of export, much timber being exported to the Argentine and Uruguay for girders and railway sleepers. In the Chaco the production of quebracho logs is a growing industry. The chief product is quebracho extract (tannin), of which as much as 50,000 metric tons are exported annually. Some 25,000 ac. are under sugar cultivation, mainly for the manuf. of spirit. There are ten sugar-mills, the most important of which are at Tebicuarí and Azucarera Paraguaya. Other products are bananas, rice, and peanuts while another crop which is gaining ground is cotton. Cotton is commonly sold as Argentine cotton, chiefly to the United Kingdom. Cottonseed oil is also a thriving industry. Iron, manganese, copper, and other minerals occur plentifully. Sev. iron-ore mines exist (e.g. Ibicuí), which were exploited in the time of López, whose foundries made cannon, cart-axes, and tyres. The Quilicó manganese mines contain ore deposits estimated at 60,000,000 tons. Copper has been found at San Miguel, Concepción, and Quilicó. Other minerals

include granite, marble, serpentine, and kaolin. Large deposits of lithographic stone of good quality were discovered a few years ago. The few secondary industries of P. produce only for the home market, the exceptions being the meat-canning factories, quebracho-extracting plants, and saw-mills. Cheap quality textiles are made from home-grown cotton which is both ginned and spun in the country. Owing to the civil war, which lasted from March to Aug. 1947, the value of P.'s exports fell from 82.7 million guaraníes in 1946 to 65.7 million in 1947, but imports increased from 66.4 million guaraníes in 1946 to 68.1 million in 1947. The chief exports are quebracho extract, cattle and meat products (in 1945 19,000 tons of canned beef were exported), hides (valued at 5,670,000 guaraníes in 1944), yerba maté (4000 metric tons in 1944, over 8000 tons in 1941), tobacco, oranges, and petit-grain oil. The chief imports are articles of food and drink, cotton goods, tobacco, and vehicles. In 1947 imports from the United Kingdom were valued at £308,534 and exports to the United Kingdom were £1,784,235.

Government.—The present constitution was promulgated on July 10, 1940. Under it wider powers are vested in the president than were given by the constitution of 1870. Though basically democratic there are authoritarian and corporative features in the new constitution. The executive power is exercised by the president, who is elected for five years and appoints the Cabinet. The Senate was abolished in 1940 and replaced by a council of state as the legislature. This council is nominated by the Cabinet and is composed of the archbishop, the rector of the univ., together with representatives of commerce, industry, agriculture (two), the army and navy (one each), and the president of the National Bank (opened in 1943). There has been a Chamber of Representatives since April 1948, there being one member for every 25,000 inhab. Elections are held quinquennially. The constitution guarantees private property, but the state has power to regulate economic activities and one of the Cabinet posts is occupied by a minister of national economy.

Religion, Justice, and Education.—The estab. religion is Rom. Catholicism, but universal toleration is the rule. P. has its own archbishop whose see is at Asunción. There are bishops at Concepción, the Chaco, and Villarica. The civil ceremony alone renders marriage valid but religious ceremonies are permitted. There are a supreme court, two courts of appeal (civil and commercial, and criminal), ten judges of first instance, and three metropolitan police magistrates. The fiscal-general represents the state both in civil and criminal cases. In the provs the functions of magistrates are exercised by lay justices of the peace, who also act as registrars; but Villarica, Encarnación, Concepción, and Pilar have judges of first instance, civil, commercial, and criminal. Primary education is free and compulsory and is also provided for adults. There are

about 1200 gov. primary schools, with a total attendance of about 180,000 pupils, and over 4000 teachers. There are some secondary schools and special schools and a national univ. with about 1000 students, and there are also a number of special colleges and 100 vocational schools, half of which latter are in the cap.

Defence.—There is an army of three divs., each with two regiments; a group of artillery, a group of cavalry, and a battalion of motorised engineers; also two regiments of mechanised 'cavalry' and one mounted regiment. There are three squadrons of aircraft. In war service is compulsory for those aged between 18 and 20 in the active army; between 20 and 29 in the active army reserve; between 29 and 39 in the national guard; and between 39 and 45 in the territorial guard. The navy comprises two armoured gun-boats, two converted merchantmen, and some well-armed riv. craft.

Communications.—The P. R. is navigable for 12-ft draft vessels up to Concepción (180 m. N. of Asunción) and for smaller vessels for another 600 m. northward. The Paraná R. is navigable by large boats from Corrientes as far as Puerto Aguirre. Asunción, the chief port, is 950 m. from the sea. There are only 300 m. of public railways, together with 450 m. of private industrial rail lines, and less than 4000 m. of roads, mostly indifferent. The Paraguayan Central Railway, with 274 m. of standard gauge line, is a Brit.-owned railway, running from Asunción to Encarnación. It is one of the oldest S. Amer. railways and had its beginning in 1854. There is now a through train service from Asunción to Buenos Aires. The Ferrocarril del Norte Railway has 33 m. of metro gauge line from Concepción to Horqueta. The other minor railways are forest lines of metro gauge or narrower. Air services are provided by five air lines (domestic and foreign). Contact with the neighbouring republics is by riv., rail, or air. It takes a little over 3 days by water from Buenos Aires to Asunción, 56 hrs. by rail, but only 4 hrs. by air. The air route to Rio de Janeiro takes 6 hrs. The national telegraph connects Asunción with Corrientes and Posadas (2070 m.). Telephone lines cover 5330 m. and the system has been gov.-controlled since the end of the Second World War. There are eight wireless telegraph stations.

Currency.—A monetary law of Oct 1943 estab. the guaraní as the unit of currency. It is equal to 100 of the old paper pesos. The guaraní is divided into 100 centimos. It is symbolised by the letter G (crossed). There are no gold or silver coins current, but there are nickel, bronze, and aluminium coins of 1, 2, 5, 10, 25, and 50 centimos. In 1949 the free market rate was 3.73 guaraníes to the U.S. dollar.

Towns.—The cap. is Asunción, pop. (urb.) 130,000 (dist.) 350,000. Other prin. tns.: Villarrica, about 31,000; Concepción, 60,000; Coronel Oviedo, 30,000; Jesus e Trinidad, 24,000; Casapá, 20,000; Caraguatay, 20,000; Encarnación, 16,000; San Pedro, 15,000; Paraguari, 12,000;

Coronel Bogado, 11,000; and Pilar, 10,000.

History.—P. was discovered by Sebastian Cabot in 1526, but the first colony there was settled in 1537 by Pedro de Mendoza, who founded the city of Asunción, and estab. the country as a viceroyalty of Peru. The warlike Guaranis long successfully resisted the invaders. In the latter half of the sixteenth century Jesuit missionaries arrived, and their work there is one of the most marvellous in missionary hist. The expulsion of the Jesuits in 1769 was a great blow to S. America. P. was the first republic to obtain its independence, and from 1814 to 1840 it was ruled by the remarkable despot, Dr. Francia. He was succeeded by his nephew, Carlos Antonio Lopez, who, dying in 1862, was succeeded by his son, Francisco Lopez, an ambitious man, who organised a most efficient army, and seems to have aimed at becoming the arbiter of S. America. The other republics recognised the danger, and Brazil, Argentina, and Uruguay engaged in a long and sanguinary war against him, which ended in the defeat and death of Lopez in 1870. The result was the ruin of P., whose pop. dwindled from 1,300,000 to about 200,000. Half a million of the people of P. are said to have been killed in the war with Argentina and Brazil in 1864. In 1912 the revolutions in progress were practically exterminating the male pop., and misery and desolation covered the land. Till recently peace was secured only by the advent or triumph of stronger political adventurers, and the duration of governments was short. Though the country had by no means recovered from these disasters, the pop. had again risen to over 1,000,000 when war broke out (1932-35) with Bolivia over the Gran Chaco (q.v. and see above).

During the Second World War the U.S.A. and Argentina both sought to influence the Paraguayan Gov., the latter being in the stronger position. But in June 1946 pressure from the Paraguayan Army resulted in a modification of the gov., and the removal of all 'Nazi' leaders. President Morínigo remained on the understanding that he would revise his Cabinet, grant a general amnesty, and hold elections. But the delaying of these elections caused a revolt against him in March 1947, which he was able to put down in Aug., with the help of Argentine arms. Its leaders having withdrawn into exile, it was safe for Gen. Morínigo to permit the presidential and parl. elections he had promised and his nominee, Juan Natalicio Gonzalez, a writer, was elected president (Feb. 1948).

See Sir R. Burton, *The Battlefields of Paraguay*, 1870; W. B. Grubb, *Among the Indians of the Paraguayan Chaco*, 1904, and *An Unknown People in an Unknown Land*, 1911; W. H. Koebel, *Paraguay*, 1917; W. Parker, *Paraguays of To-day*, 1920; A. E. Elliott, *Paraguay: Cultural Heritage, Social Conditions, and Educational Problems*, 1931; I. M. Sosa Escalada, *El Paraguay Occidental*, 1934; P. de Rondo, *Paraguay*, 1935; and J.

Vellard. *Une Civilisation du miel: Les Indiens Guayakis du Paraguay*, 1939.

Paraguay River, important riv. of S. America, an affluent of the Paraná (q.v.), rises in Mato Grosso in Brazil on a plateau of red sandstone. The P. takes a S.W. course and, after flowing through a level country covered with thick forests, is joined from the W. by the Jauru. It then flows S. through the marsh of Karazes, and winds southwards, forming for a space the boundary between Brazil and Bolivia. It then pursues a S.S.W. course and passes through the republic of P. to join the Paraná a few miles above the tn. of Corrientes. Its chief affluents are the Cayaba, Tacuary, Mondego, and Apa on the left, and the Jauru, Pilcomayo, and Vermejo on the right; its total length is about 1800 m.; it is navigable for steamers to the mouth of the Cayaba, 100 m. above the tn. of Corumbá.

Paraguay Tea, see MATÉ TEA.

Parahyba, or **Paraíba**, state on the N.E. coast of Brazil, between Pernambuco and Rio Grande do Norte. Cotton-seed, cotton, and tapioca are produced. Cap. João Pessoa. Area 21,730 sq. m. Pop. 1,655,000.

Parahyba do Sul, **—** in Brazil, which flows between the Serra da Mantiqueira and the coast range of Rio de Janeiro, and is only partly navigable. Length 530 m.

Parakeet, unscientific name for small long-tailed parrots, with a moderate beak and high slender tarsi. Among the best known is the ring-necked P., which is very common in India and Africa, and in some dists. is a serious pest of agriculture. Its gay plumage and hardness make it a popular pet, and large numbers are imported. The crested ground P. or cockatiel is another hardy bird, and breeds readily in confinement. It and the undulated grass P. or budgerigar are natives of Australia; both are extensively kept as pets. A beautiful P. is the king P., which is about the size of a magpie and has a red head and breast and green wings.

Paraldehyde, colourless liquid (boiling-point 124° C.), obtained by adding a drop of concentrated sulphuric acid to acetaldehyde (q.v.). It has the formula $(C_2H_4O)_3$, and is used as a soporific (the so-called 'K.O. drops' of the crime novel).

Parallax. The P. of a heavenly body comparatively close to the earth, e.g. any member of the solar system, is the angle between two lines drawn to it, one from the observer on the earth's surface and the other from the earth's centre. Obviously if a body is in the observer's zenith these two lines will coincide, in which case the body has no P. and if it is on the horizon the angle will attain a maximum value and is then known as the *horizontal P.* (H.P.). Between these two extreme values the P. will vary owing to the rotation of the earth, and the effect of P. is to increase a body's zenith distance. The *Nautical Almanac* and other similar pubs. give the positions of the heavenly bodies as if they were viewed from the centre of the earth, thus eliminating the effects of P. Hence any such body observed from the earth's surface will

have a greater zenith distance and less altitude than would be derived by using the data supplied in the *Nautical Almanac*, and corrections must be applied. The moon's P. is the easiest to measure owing to the proximity of our satellite to the earth, and the method adopted is similar to that used by a surveyor who measures a base line and two angles. If O and O' are two observatories, separated as far as possible, and M is the moon, by a method well known to astronomers the angles MOO' and $MO'O$ can be measured, and as the length of the line OO' is known, the distances OM , $O'M$ are easily found and also the distance OM , where C is the centre of the earth. When the distance of the moon or any other object in the solar system from the earth's centre is known, the H.P., denoted by P , is found from $\sin P = a/d$, where a is the earth's equatorial radius and d the distance of the object from the earth's centre. The same principle is used for finding the distances and hence the H.P. of planets, but owing to their greater distances from the earth the same accuracy is not attainable because small errors in the angles corresponding to $OO'M$ and $O'OM$ involve relatively great errors in finding the lines corresponding to OM and $O'M$. The H.P. of the moon varies because our satellite describes an ellipse in its revolution round the earth and hence its distance d varies; the mean H.P. of the moon is about 57' whereas the maxima for Venus and Mars are 31' and 21' respectively, and for those of the other planets (not including all the minor planets) less still. It should be emphasised that no Ps. can be determined directly, that is, they cannot be ascertained by placing one observer on the surface of the earth and another at its centre and measuring the angle subtended by the earth's equatorial radius at the body. The method for finding the moon's P., already explained, is applicable also to the sun and the planets, but great accuracy in such cases is unobtainable, and the procedure for the sun is as follows. Kepler's third law (q.v.) states that the squares of the periodic times of any two planets, that is, of their times of revolving round the sun, vary as the cubes of their mean distances from the sun. The periodic time of a planet can be determined with great accuracy from observation and the minor planet Eros has proved very useful to astronomers for finding the P. of the sun owing to its close approach at times to the earth. Its periodic time is about 1½ years, from which it is easy to compute its mean distance from the sun is 1.45 times the earth's mean distance. From these figures it is possible to derive the distance of Eros from the earth at any particular time *in terms of the earth's mean distance from the sun—not in m.* Now when Eros makes a close approach to the earth (say about 16,000,000 m.) its distance from the earth is measured in the same way as the moon's distance and expressed in m., and hence the astronomer knows that a certain number of m. corresponds to a certain fraction of the earth's mean distance from the sun.

From this he knows the earth's mean distance from the sun in m. Although the actual determination of the distance of Eros from the earth cannot be carried out with such accuracy as is done in the case of the moon, because Eros even at its nearest approach to the earth is more than fifty times the moon's mean distance, yet this distance is very much less than the distance of the sun, about 400 times the moon's distance. Mr. A. Hinks used this method when Eros made a close approach to the earth in 1900-1 and the astronomer royal, Sir Harold Spencer Jones, also utilised it when Eros made a closer approach in 1931. The following approximate figures will show more clearly how the sun's mean distance from the earth, known as the astronomical unit (A.U.), is derived. Using Kepler's third law, the mean distance of Eros from the sun is 1.45 A.U. and on a certain date its computed mean distance from the earth was 0.17418 A.U. On the same date its distance from the earth, found by the same method that is employed for determining the moon's distance, was 16,200,000 m., and hence 1 A.U. is $16,200,000/0.17418 = 93,005,000$ m. The H.P., derived from $\sin P = a/d$, a being 3963.35 m., the earth's equatorial radius, and d 93,005,000 m., gives $\sin P = 0.000042611$, or $P = 8''.79$ nearly. Other methods for determining the distances of the sun and the planets will be found under appropriate headings. See ABBERRATION; PERTURBATIONS; VELOCITY OF LIGHT.

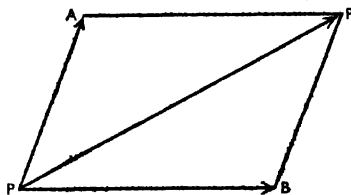
Stellar Parallaxes.—The earth's radius subtends such a small angle at the distance of the nearest star that it cannot be detected. A much longer base line is necessary and this is provided by the diameter of the earth's orbit, which is about 186,000,000 m. A star is observed at each end of a diameter, an interval of six months intervening, and the principle is practically the same as that used in finding the moon's distance. At each end of the diameter selected, not only is the star photographed, but in addition another faint star in its field is also photographed, the presumption being that the fainter star is very far off—so far that it may be assumed at an infinite distance and hence lines drawn from the earth at each position of its orbit to this faint star are practically parallel. In these circumstances a displacement of the brighter star whose P. is sought, relative to the fainter star, takes place, from which the angle subtended at the former by the diameter of the earth's orbit is easily found. This supplies the necessary data for finding the distance of the star. Many refinements are essential in the method, but the above gives the general principle involved, and when the distance of the star has been determined its P. is supplied with the following implication. The P. of a star is the maximum angle subtended at the star by the earth-sun line; when this line is not at right-angles to the sun-star line, reductions are made so that the P. refers to the maximum angle. An example will show how stellar P.—often referred to as *ann. P.*—can be reduced to

A.U.s. and from this to light years. The P. of Proxima Centauri, the nearest star to us, is $0''.783$, and using the formula $\sin P' = a/d$, or $d = a/\sin P$, a and d in this case denoting 1 A.U. and the distance of the star, respectively, $d = 1/0.000003796 = 263435$ A.U. Since one A.U. is 93,000,000 m., the distance in m. is 24.5 million million or 24.5×10^{12} . A light year is 5.88×10^{12} m., and hence the distance of the star is about 4.2 light years. Various other methods besides the above trigonometrical method are used for finding the distances of the stars. See under STARS, Cepheid Variables; SPECTRUM AND SPECTROSCOPE.

Parallax of the Fixed Stars, see preceding article and STARS.

Parallelepiped (*parallelopiped*, wrong spelling), solid figure having six faces, all parallelograms, any two opposite being similar and parallel; the edges equal and parallel on opposite faces, the diameters meeting in a point. With square faces it becomes a cube. The ordinary rectangular box is another form. The volume is the product of the area of any face as base and the vertical height between it and the opposite face.

Parallelogram of Forces. When two forces act in different directions, not opposite, on a point P, the resultant or 'combined' force acting as one can be determined as to direction and magnitude



PARALLELOGRAM OF FORCES

by constructing a parallelogram, with sides PA, PB representing the two forces in direction and magnitude. The diagonal from the point PR gives the resultant. All vector (*q.v.*) quantities, such as velocities and displacements, are similarly determined.

Paralysis, or Palsy, in medicine, denotes the loss of power of movement, but applies also to loss of function; incomplete P. (diminished power) is known as *paresis*. There are three classes: *cerebral*, *spinal*, and *peripheral*. Cerebral P. arises from destruction of motor nerve cells of the surface of the brain, or from interruption in the nerve fibres leading to the spinal cord. 'Hemiplegia' is characterised by unilateral P. of the body in the legs, arms, etc., with aphasia (loss of speech), if on the right side. The facial muscles and tongue are generally affected, the eyelid and mouth drooping. Cerebral P. usually follows ruptured blood-vessels or choking by clots, etc.; tumours, abscesses, fracture of the skull, epileptic fits or hysterical fits may be the cause. Recovery may take place if the paresis results from

pressure only, but such is not common. Spinal P. is due to pressure, interruption, or destruction of the nerve cells or fibres in the spinal cord or those passing to the muscles. Sensory P. is more often found than in the cerebral form, where 'hemianasthesia' is unusual. In 'paraplegia' both sides of the body are affected in certain areas depending on the position of the lesion in the spine; reflex movements may remain unaltered; motor areas on one side and sensory on the other may be affected. Spinal P. in its oncom is seldom marked by convulsions, but it is often characterised by progressive waste of muscles. Peripheral P. arises from affection of the nerves or muscles. Facial P. (Bell's P.) is due to affection of the seventh cranial nerve caused by disease of the ear, or exposure to draught. Lead palsy is characterised by 'wrist drop,' with affection of the muscles of the forearm. 'P. agitans,' the form in old age, is accompanied by tremors, loss of equilibrium, and rigidity. 'Diphtheritic P.' is an affection of the structural protoplasm due to a bacillus and its ptomaines. 'Birth P.' in its various forms, often in the legs and feet, is of frequent occurrence owing to difficult labour and consequent injury to the brain or spinal cord. 'Bulbar P.', a rapidly fatal form, affects the speech and centres of deglutition; it springs from the *medulla oblongata*. P. is usually accompanied by flaccid muscles, though there may be temporary rigidity; the muscular fibres are replaced by contractile connective tissue, and the limbs become permanently bent and immobile. Traumatism, embolism, hæmorrhage, tumour, and thrombosis are the chief causes, alcoholism and syphilis and other diseases affecting the circulatory system are also among the causes. Infantile paralysis (*q.v.*) (*polio-myelitis*), which affects the motor areas in the grey matter of the spinal cord, is a virus infection which is a further cause of P.

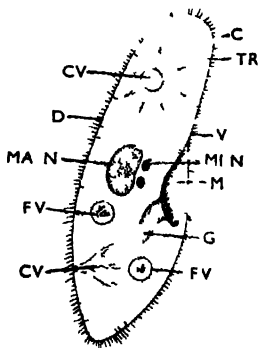
Treatment.—If not too advanced and accompanied by debility, gentle exercise and massage may be resorted to, but with care; faradisation is supposed to be of some benefit, but as a rule treatment must consist in attending to all the rules for health which are falling out of use by the patient. The bowels should be kept open, and attention paid to the emptying of the bladder, by catheter if necessary. Bed sores should be guarded against. Fresh air and sunshine and warmth of clothing must be supplied; mental rest is essential, and after a seizure complete rest in bed. See also GENERAL PARALYSIS. See W. R. Brain, *Diseases of the Nervous System* (3rd ed.), 1947.

Paralysis of the Insane, General see under INSANITY (CLASSIFICATION)

Paramaribo, cap. and chief port of Surinam (Dutch Guiana), on the Surinam R., 12 m. from the sea, and 214 m. from Georgetown, Brit. Guiana. It is the centre of the trade of the colony, and it is a station on the U.S.-Argentine air route. There is a deep-water frontage of a mile. A metre-gauge railway runs to Dam (100 m.). Pop. 74,000.

Paramatta, see PARRAMATTA.

Paramecium, or **Slipper animalcule**, one of the group of Protozoa formerly known as Infusoria, but now classified as Ciliata. The name Infusoria (*q.v.*) was originally applied to these and similar organisms because they were observed in infusions prepared from such organic substances as hay, seeds etc. The group is now limited to those protozoa which have a permanent investing pellicle, a large and one or more small nuclei, and an arrangement of cilia by which they move about. One section of the ciliata includes organisms which are usually ciliated only in the young state and acquire their food from the surrounding medium by suction, these are known



PARAMECIUM, THE SLIPPER ANIMALCULE

A, anterior end, C, cilia, CV, contractile vacuole, D, dermis, MA N, macro nucleus, MI N, micronucleus, IV, food vacuole, G, gullet, M, mouth, P, posterior end, TR, trichocyst, V, vacuole

as *suctor*. The remaining members of the ciliata comprise organisms permanently provided with cilia, and it is to this group that the P. belongs. The P., as its alternative name suggests, is shaped like the sole of a slipper, but is only about 0.01 in. long. The surface is provided with rows of cilia arranged longitudinally. The cell is surrounded by a definite pellicle, and contains within its body food vacuoles formed by the particles of food collecting bubbles of water about them as they pass from the oral cavity into the endoplasm; the food passes in an elliptical path through the endoplasm and becomes gradually digested. There are also two contractile vacuoles which function alternately and act as osmotic organs. Water is constantly absorbed by osmosis over the whole pell. and these vacuoles suddenly contract and forcibly expel it. Experiments made to show that the function of these vacuoles is excretory have so far failed. The P. provides itself with food by lashing the water with its cilia. These also serve as an organ of

locomotion, the cell taking a peculiar zigzag path at a constant angle to the general direction of its motion. The food is directed into a funnel-shaped 'mouth,' within which is a thin membrane. This by its movements, aids the direction of the food into the animal. Reproduction is effected by fission and by conjugation. In the former case, first the smaller or micronucleus, then the larger or meganucleus, become constricted and divide into two by oblique division, and the missing organs in either part are quickly regenerated. It is observed that frequent multiplication by fission diminishes the vitality of the organism and is succeeded by conjugation, when two exchange part of the substance of their nuclear apparatus and so obtain a new lease of life. When conditions become unfavourable the animals encyst themselves.

Paraná: 1. City of Argentina, cap. of the prov. of Entre Ríos, on the P., facing the tn. of Santa Fé, 400 m. by riv. from Buenos Aires and 365 m. by the Mitre and Urquiza railways. It is the centre of a grain-growing dist. For a few years from 1853 the city was the cap. of the Argentine. The chief objects of interest to visitors are the governor's palace, the cathedral, and the Urquiza Park. P. is a bishop's see and the seat of a univ., and a thriving riv. port. Pop. 75,000. 2. Coastal state of S. Brazil, between Paraguay and the Atlantic. W. of the low-lying coastal strip are the mts. of the Serra do Mar. Timber, cereals, rice, fruit, and cotton are produced, and there are coal deposits. Cap. Curitiba. Area 77,717 sq. m. Pop. 1,438,000. 3. Great riv. of S. America, formed by the confluence of the Rio Grande and the Paranaíba. The Rio Grande rises in the state of Minas Gerais, Brazil, and flows N.W. and W. to the point of confluence. As the P. the two rvs. then flows in a S.W. direction through Brazil, then S., forming the boundary between Brazil and Paraguay. Thence it sweeps W. between Paraguay and Argentina to receive its prin. trib., the Paraguay. It then flows S.W. to Rosario and S.E. to unite with the Uruguay in the Plata estuary. Cataracts and rapids render it unfit for navigation over a large part of its course, but for the last 1000 m. it is always navigable even by large steamers. Its total length is about 2500 m., excluding the Rio Grande, its true headstream.

Paranáguá, chief seaport of the state of Paraná, Brazil, 55 m. E. of Curitiba. It is situated on a lagoon-like bay of the same name; its quay is small but modernised. The bar is to be dredged to receive ships of greater draft. Coffee, sugar, spice, and maté are exported, as well as bananas, maize, wood, and other products. The port dates from the colonial period and in the tn. there are some historic churches. The rail journey to São Paulo is 660 m. Pop. 23,000.

Paranoia, see under INSANITY (CLASSIFICATION).

Parapet (from the It. *parapetto*), low or breast-high wall or fence, to serve as a protection on bridges, terraces, platform-

roofs, etc. In It. architecture Ps. are generally balustrades. In Gothic architecture the P. is merely a continuation of the wall carried up above the edge of the roof and finished by a coping, unless machicolated, in which case it projects and overhangs the walls below. In the Lombardic buildings of Italy, and frequently in the Norman style, there is seldom any P., the eaves of the roof finishing the elevation. In Elizabethan buildings open-work Ps., forming various fantastical devices, are common.

Paraphrase (from Gk. *παρά*, beside, and *φρασις*, to speak), name given to a re-statement of a passage in prose or verse, so as to bring out its meaning with greater lucidity, without altering the sense of the original by change, addition, or subtraction. In music a P. is a free adaptation of a piece of music so as to suit it to other instruments. The metrical arrangements of portions of Scripture which are sung with the psalmody in the Scottish Church are called Ps.

Paraphrenia, see under INSANITY (CLASSIFICATION).

Parapsychology, see PSYCHICAL RESEARCH, and under PSYCHOLOGY.

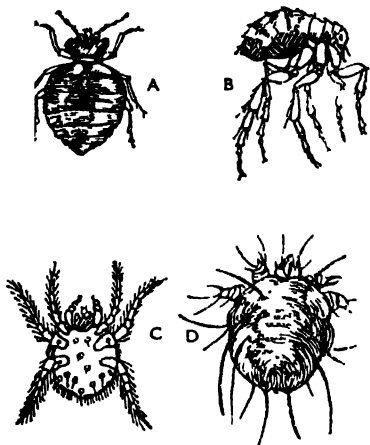
Paraselenae, see MOCK SUNS AND MOONS.

Parasites (Gk. *παράσιτος*, one who eats beside, or at the table of another, or at another's expense), living organisms which pass the whole or a part of their existence on or in other living organisms or hosts without conferring any benefit. They do this essentially for the purpose of obtaining nourishment from their hosts, not merely for shelter. In recent years numbers of instances have been observed where one creature is in intimate association with another purely as a commensal (q.v.). For instance, small sea anemones are transported in the claws of two species of crabs, which take any food the anemones cannot completely swallow. The anemones probably gain from the transportation more opportunities of catching prey. Some small fishes shelter themselves beneath the 'umbrella' of large jelly fishes, others in the gullet of large sea anemones, and one in the hind gut of a sea cucumber. But in none of these and other similar cases does one of the commensals live or rear its young at the expense of the other, and hence they are not termed P. These are, however, of considerable interest as indicating how in many cases a parasitic life was entered upon, and one view of symbiosis maintains that it is the perfection of parasitism.

Until parasitology became an estab. science, attempts were made to classify P.: there were Ectozoa, or P. which live on the surface of the host, and Endozoa, which live in the blood or internal parts; but this is artificial, and the only satisfactory classification is along biological lines. (For plant- or phyto-P. see PARASITIC PLANTS.) The gradation of the symbiotic into the ectoparasitic habit is well illustrated by different barnacles. *Balanus* lives almost indifferently as a commensal on various animals such as whales, crabs, and sharks; but *Anelasma*, living on the shark, sends haustoria into

it, and thus establishes itself as an ectoparasite. Having adopted this mode of life, *Anelasma* has apparently to be maintained by sharks or to die, for it is unable to make other animals its hosts as indifferently as *Balanus* makes them commensals. In this way biological species of both plant and animal P. have been estab. From those examples where the prey or host is quickly destroyed, there is every degree of elaboration up to the stage of such perfect and (at any rate in the adult stage) harmless parasitism as those which merge into symbiosis.

The absence of serious injury by a parasite points to a long period of natural selection in which, on the one hand, the



SOME EXTERNAL PARASITES

A, bed bug $\times 4$; B, flea $\times 6$; C, harvest mite $\times 6$; D, itch mite $\times 20$. (See also the illustration to Lice.)

parasite has been brought to a high degree of harmlessness, and, on the other hand, the host has become able to tolerate the parasite without being injured or poisoned by it. The most deadly P. are those that have recently acquired the habit and have not had time to become modified, and whose hosts have not acquired a tolerance of their presence. Some avoid killing the host only while their dependence upon it is essential. A caterpillar, for example, in which an ichneumon fly has laid her eggs, does not die until it has passed into the pupal stage, when the grubs of the fly which have fed upon it have become full grown and have also pupated. As parasitism becomes more pronounced, definite structural features are evolved, such as hook-like claws or suckers for secure attachment to the host and cuticles that are adequately protected against the action of digestive juices—to such a high degree indeed of adaptation is evolved this power of tolerating the chemical qualities of the gastric juice, that some P. are poisoned and destroyed if they gain

admission to hosts of species other than those to which they have accustomed themselves. There are remarkable instances of this in the case of the microscopic parasite which causes malaria, and which can be conveyed only by the spotted-winged gnat (*Anopheles*); it is destroyed in the system of other gnats. Similarly the ciliated embryo of the liver fluke refuses to enter any small other than *Limnæa trunculata* and also, according to recent work, young specimens of *L. stagnalis*, as an intermediate host. Motor and other organs become atrophied as in the wingless insects (e.g. fleas) which have adopted parasitic life, while in the leech the alimentary tract is considerably simplified, and in the tapeworm the digestive system is completely aborted, as to a large extent are the nervous and sense organs. A large proportion of the so-called Entozoa require more than one host in which to complete their life-history. The host in which the adult reproductive stage is reached is the 'ultimate' or 'definite' host, and that in which the life-history is begun with the entrance of the ova or newly hatched larvae is the 'intermediate' host. For instance, the embryos of the tapeworm, picked up by pigs with their food, become encysted in their muscles, causing 'measly' pork, which if not properly cooked introduces the tapeworm to the intestines of man, where it passes into the adult stage. To counteract the slender chances of the completion of the life-history, which in the case of the liver fluke passes through seven distinct stages, many P. are extraordinarily prolific. A single tapeworm, (see CESTODA), for example, produces some 75,000,000 young, of which perhaps, on the average, not more than one becomes estab. in its ultimate host. It is doubtful if any vertebrate is a true parasite, though the lamprey-like hagfish (*Myxine*) eats its way into the turbot, cod, and other fish, where it is often found by fishermen; but its stay in the body of its victim is short. The highest P. of importance in the animal kingdom are the various Arachnids, which include the numerous mite species. Among insects P. are numerous, and with them may be mentioned aphides, or plant-lice, the gall-wasps and gall midges, and many others parasitic on plants.

As an instance of the artificiality of the classification of P. as external and internal, there is the instance of *Acaris megalocephala*, which lives in the intestine of the horse and is usually described as an endoparasite. Since, however, no penetration of cells is involved, it seems better to regard organisms living in the gut as ectoparasites, and those in the cells or blood stream as endoparasites. Among flat worms or Platyhelminths, and round worms, or Nematodes, parasitism is very frequent and gives rise to a number of serious diseases. The Sporozoa—a class of the Protozoa or unicellular animals—include a large variety of parasitic organisms of such importance as those that cause malaria, sleeping sickness, and amoebic dysentery. P. are

usually described as degenerate, but the criterion of degeneracy needs first to be clearly established. Viewed structurally P. are usually much simpler than related free-living forms. They have evidently lost the complex structure once possessed, so that if complexity be a criterion, P. are usually highly degenerate. *Sacculina* and *Pellogaster*, for example, are little more than ova-producing structures. If, however, success be a criterion, most P. are better described as highly specialised rather than as degenerate, for they may be regarded as highly successful, and they have elaborate reproductive organs. The Nematodes, well advanced in parasitic habits, are very widely distributed and very numerous. The food of the parasite is often pre-digested by the host; consequently a simple alimentary canal or absorptive area is sufficient for the parasite. It is often transported by the host, and therefore needs no organs of locomotion, unless a free-living phase occurs in its life-history. Even in this case the organs of locomotion are usually ill-developed, since they are little used. Thus degeneracy of structure is correlated with adaptation to the mode of life, and it may be questioned whether adaptation is degenerate. The degeneracy here appears to be an ethical question rather than a biological one.

Although P. are frequently highly successful, their hosts suffer considerably (see PARASITIC DISTRESS). Even when the parasite has established some sort of harmony with its host, to the extent that the host continues to live, there is frequently a reduction in size, and a disturbance in metabolism sufficient to effect sex reversal occurs when the crab is parasitised by *Sacculina* or by *Pellogaster*. Parasitism is a highly specialised mode of life favourable to the parasite but, at best, harmless to its host. At its worst, it destroys the host, but this usually indicates the beginning of a parasitic career, or an attempt to parasitise a new host. See also BACTERIOLOGY; CESTODA; PATHOLOGY; SYMBIOSIS; and articles on individual P.

See A. M. Kennedy, *Parasitology for Medical Students*, 1925; C. Fox, *Insects and Disease of Man*, 1926; P. A. Maplestone, *The Nematode Parasites of Vertebrates*, 1926; R. Huxner, *Host-parasitic Relations between Man and his Intestinal Protozoa*, 1927; E. Brumpt, *Précis de parasitologie*, 1927; R. Huxner, F. M. Root, and D. L. Augustine, *Animal Parasitology*, 1929; D. and C. T. Rivas, *Clinical Parasitology and Tropical Medicine*, 1935; and A. C. Chandler, *Introduction to Human Parasitology* (7th ed.), 1945.

Parasitic Diseases. Many parasites cause but little inconvenience or derangement to their hosts, but others give rise to serious disorders, some of which under suitable conditions are fatal. Probably further research will show a considerable proportion of all diseases to be due to parasites, high or low, animal or vegetable. Already a long list can be compiled of diseases due to specific organisms. Among the higher invertebrates, many Arthropoda

cause P. D. of plants and animals. Mange is due to three types of Arachnida, the Sarcopites, Psoroptes, and the Symptotes. The Sarcopites burrow into the flesh of domestic animals, causing considerable irritation and shedding of hair, the Psoroptes bite and feed on the exudations, and the Symptotes feed on scurf and debris around the hair. 'Isle of Wight' disease of bees is caused by a mite (*Acoraptis woodi*) which infects the breathing tubes. Amongst Insecta, the larvae of warble flies do considerable damage to cattle by burrowing into and eating the flesh, and escaping through the skin so that the hide is punctured. In addition, parasitised cows produce less and poorer milk. Sheep are debilitated by the larvae of the sheep nostril fly, and also suffer from infection with various 'worms.' A tapeworm, *Conurus*, causes the disease variously called 'sturdy,' 'gid,' or 'staggers.' Another tapeworm, *Tenia echinococcus*, causes hydatid disease in man. Amongst Trematoda, *Fasciola hepatica* feeds in the liver of sheep and occasionally of man, and species of *Schistosoma* cause Bilharziasis (q.v.). The Nematodes or round worms have attained a great degree of harmful parasitism, giving rise in man to miners' worm (hook worm), guinea worm, elephantiasis, and trichinosis. *Syngamus* causes gapes in poultry, and *Heterodera* forms root galls on tomatoes, cucumbers, and other plants. Amoebic dysentery, sleeping sickness, and malaria are due to parasitic Protozoa, and bacteria are responsible for many serious diseases such as tuberculosis, meningitis, and pneumonia. Ringworm and thrush are caused by parasitic fungi. Fungi are also the chief cause of disease in plants. See BACTERIOLOGY; ENTOMOLOGY.

Parasitic Plants. A large number of plants, especially fungi, have developed parasitic habits, some of which are the cause of serious loss to cultivated plants and trees. The number of Brit. phanerogamic (flowering) parasites is small; the dodders (*Cuscuta*) are the only ones of serious economic importance, often doing considerable damage to crops of clover and lucerne, into the tissues of which they send suckers. After germination a seedling dodder can live independently for two or three weeks; but if within that time it has not found a suitable host, it perishes, as the entire absence of chlorophyll prevents it from utilising inorganic food. The broomrapes (*Orobanchae*) are so dependent on their hosts that unless in contact with them the seeds cannot germinate. The toothwort (*Lathraea squamaria*) is also destitute of chlorophyll, but is said to supplement the food appropriated from the roots of various broad-leaved trees (e.g. hazel and elm) by animal organisms which get into small cavities in the leaves. In these cavities are glandular cells similar to those of certain insectivorous plants, but there is no conclusive evidence of the function of these cells. The mistletoe, eyebright, yellow rattle, and cow-wheat are partial parasites, for all these plants contain chloro-

phyl and can assimilate carbon dioxide, though dependent upon their hosts for water and salts. Among the fungi, the rusts and smuts do considerable damage to cereal crops; the mildews to hops, grape vines, gooseberry plants, and various fruit trees. *Phytophthora infestans* is the cause of potato blight, which led to the Irish potato famine in 1846-48. Ringworm and other skin diseases of man are caused by parasitic fungi (see ACTINOMYCOSIS; FUNGI). Most extraordinary of the numerous P. P. of the tropics is the huge-flowered *Rafflesia*, which grows on the *Cissus*; the flower, said to measure a yard in diameter, is the largest known. See F. T. Brooks, *Plant Diseases*, 1928.

Parasitology is the scientific study of parasites (q.v.).

Parasitoidine, see TOLUIDINE.

Paratroops and Airborne Troops. The first expression is sometimes loosely used to cover the meaning of the second. Airborne troops are of all arms and are specially trained and equipped to arrive at the scene of action by air, usually in ter. held by the enemy. They may be transported in gliders or powered aircraft which land and disembark small units complete in the assembly area, or, as P. proper, they may drop by parachute from aircraft, together with the greater part of their weapons and equipment. All the infantry and a proportion of other arms of a modern airborne div. are trained as P. Training of P. is strenuous, both physically and mentally, and consists in exercises of endurance and agility similar to those performed by commandos, together with jumping from towers, moving vehicles, captive balloons, and finally aircraft.

The employment of parachutists as an integral part of military organisation was first demonstrated by Russia in 1936. Although in the Second World War Russian airborne troops confined themselves to the role of organising and leading partisans in the Ger. back areas, in the W. this war saw a rapid development in the use of airborne troops. Parachutists were extensively employed by both sides for purposes of espionage and sabotage, but airborne troops were first employed on a large scale by the Gers. in the Low Countries in the spring of 1940, notably in the capture of Dutch airfields by parachutists, and of the fortress of Eben Emael on the Albert Canal by gliderborne troops. The invasion of Crete in 1941 may be taken as the culminating point of the Ger. airborne effort. After this, though the number of Ger. parachute divs. rose considerably, they were never used in their proper role, owing to the lack of transport aircraft to land and supply them. Ger. airborne divs. formed part of the Luftwaffe.

Brit. parachute troops began their operations with harassing and reconnaissance operations such as the raids on Lofoten and Bruneval and in support of the Canadian sortie against Dieppe. Parachutists were used in the allied landings in N. Africa in 1942, and airborne troops in gliders flown by sergeant-

pilots of the Glider Pilot Regiment took part in the invasion of Sicily, especially in the fighting round the Gornalunga Bridge, where they came face to face with Ger. parachutists. The Brit. 2nd Parachute Brigade occupied strong points in Catania to prepare the Eighth Army's landing there and the same brigade was used in a sea landing role at Taranto, and operated around Gioia del Colle between there and Bari. It also took part in the Sangro battle in 1943, but not in an airborne role.

On the W. front the allied landings in Normandy were preceded by heavy droppings of parachutists, especially on the left bank of the bridgehead. In the autumn of 1944 an attempt was made to seize the crossings of the Lower Rhine by



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BRITISH PARATROOPS

dropping elements of the Brit. 1st and 6th Parachute Divs. and a Polish parachute brigade at Arnhem and Amer. parachute troops at Nijmegen. Owing to unfavourable weather, the quickness and violence of the Ger. reaction, and the failure of the Brit. Second Army to break through the Ger. troops encircling the Arnhem bridgehead, the Brit. and Polish P. had to be withdrawn. In support of the crossing of the Rhine by the allied 21st Army Group large forces of the 1st Allied Airborne Army were dropped a short distance behind the Ger. defences on the right bank of the riv. This operation may be taken to demonstrate the diminishing margin of profit accruing from the use of airborne troops. They were first employed to achieve surprise and attack in depth. As their use became more frequent so the element of absolute surprise diminished. As the reaction of the defence became more rapid and determined, so the time permissible in which they might effect a junction with their own ground forces was reduced and their range of action, the depth to which they could attack, was shortened. The Arnhem operation showed how short was the

time during which a large airborne force could be supported and supplied from the air except under the most favourable weather conditions. At this stage of the war it may be noted that two Ger. parachute divs. were fighting as ground troops in Italy, and the remaining seven in a similar role on the Lower Rhine. Yet such was the allied air superiority that none of these Luftwaffe troops could be dropped from the air, and the Ardennes offensive of Dec. 1945 was deliberately mounted in weather conditions which it was hoped would preclude air activity. Typical Ger. airborne operations of the second half of the war are the rescue of Mussolini from his prison on the Gran Sasso d'Italia by airborne troops under the Waffen S.S. Maj. Skorzeny in 1943 and the attempt to kidnap Tito at his headquarters in 1944. Both are good examples of the kind of *coup-de-main* to which the airborne arm lends itself.

In the last stages of the It. campaign allied P., including elements of the It. Nembo and Folgore divs., were dropped to secure crossings of the Po and the Adige.

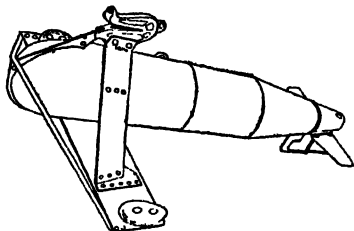
P. in general are armed with ordinary hand weapons as carried by infantry, but some have been modified so as to reduce weight and bulk, as have some infantry support weapons such as the Brit. 3-in. mt. howitzer and six-pounder anti-tank gun. Airborne engineer equipment consists mainly of explosives for demolition, prepared charges of all kinds, and light-weight anti-tank and anti-personnel mines. Special parachutist weapons and equipment include the Ger. *Fallschirmgewehr* (an automatic rifle) and recoilless infantry gun, and the Brit. 'Corgi'-type collapsible motor-cycle. Special types of tank have also been modified for airborne use. See F. O. Miksche, *Paratroops*, 1943, and H. St. George Saunders, *The Red Beret*, 1949.

Paratyphoid Fevers were separated from typhoid fevers by Acharid and Ben-aude in 1896, and are of three types, designated A, B, and C. They are caused by infection with three varieties of *Bacillus paratyphosus*, the infection being carried by water contaminated with sewage, by milk and milk products, by food, or by animal carriers. The diseases are clinically indistinguishable from one another and from typhoid fever, although the latter is fatal in a higher percentage of cases. Microscopic examination of the bacilli reveals differences, and the reactions with sugars and with sera are different.

Before the First World War paratyphoid A was known only in E. Asia, paratyphoid B was confined to Europe, and paratyphoid C was most common in S.W. Europe and in Mesopotamia. During the war paratyphoid A and B became epidemic in the armies on the W. front and in the Near E., and all three types of fever have since been distributed throughout Europe and Asia. Although an attack of one type of paratyphoid fever or of typhoid fever does not immunise against an attack of any other type, it was found that soldiers inoculated

with antityphoid vaccine were to some extent protected against P. F., for the disease was much milder in character than in un inoculated men. For complete immunity inoculation with vaccine containing bacilli of each type is necessary. Treatment is the same as for typhoid fever. (See also BACTERIOLOGY; EPIDEMIOLOGY; TYPHOID FEVER.). See Goodall and Washbourn, *Infectious Diseases* (3rd ed.), 1928, and C. B. Ker, *Manual of Fevers* (4th ed.), 1939.

Paravane is a contrivance developed by Commander Usborn and Lt. (now Sir Dennistoun) Burney during the First World War as a protection for ships from mines. It consists of a cigar-shaped body made of welded steel plate. At its nose-end it carries an eye for a towing-cable, a fixed cutter for cutting the moorings of a mine, and a small steel plane for stability.



PARAVANE

At the tail-end are two rudders actuated by a hydrostatic valve which controls the depth at which the P. is required to run; also small horizontal and vertical fins. A P. is towed on each side of a ship by steel ropes attached to the stem and is adjusted to run submerged at a given depth generally slightly below the level of the keel—about 50 ft. from the ship's side and about 180 ft. from the stern, depending on the length of the vessel. The towing-cable thus forms a wedge which, when it comes in contact with the mine, mooring-wire deflects the latter away from the ship and leads it to the powerful cutter on the P., where it is severed, thus permitting the released mine to rise to the surface, when it can be destroyed. There is no danger of a ship registering a direct hit with its stern on a mine, owing to the cushion of water which a ship's stern pushes in front of her having the effect of deflecting the mine to one side or the other. Another type of P. contained explosives and was developed in 1916 to destroy submarines whose positions were approximately known. It was towed at high speed by the attacking vessel and the charge could be fired by electricity or automatically on the P. striking its target. But, with the development of asides, the P. as an anti-submarine weapon became obsolete and is only used to-day as a protective device.

Paray-le-Monial, tn. of the dept. of Saône-et-Loire, France, 48 m. W.N.W. of Maçon. At the convent of the Visitation

the nun Marie d'Alacoque was reputed to have had visions of the Saviour. The tn. manufs. ceramics and tiles, and has oil refineries. Pop. 7100

Parcæ, see MOIRÆ.

Parcel Post, see under POST OFFICE.

Parceners, see CO PARCENERS

Parchim, tn. in Mecklenburg, Germany, 20 m. S.E. of Schwerin. Moltke was born here. Pop. 12,000.

Parchment, skin of the sheep, lamb, goat, pig, or calf, prepared for writing upon. When the skin is divested of its hair or wool, it is placed for some time in a lime-pit, and then stretched on a square wooden frame drawn tight by pegs. When in the frame it is first scraped on the flesh side with a blunt iron then wetted with a moist rag, covered with pounded chalk, and rubbed well with pumice stone. After a short pause these operations are repeated, but without chalk. The skin is then turned and scraped on the hair side once only. The flesh side is scraped once more, and again rubbed over with chalk. All this is done by the skinner, who allows the skin to dry in the frame, and then cuts it out and sends it to the parchment-maker, who repeats the operations with a sharper tool, using a sack stuffed with flocks to lay the skin upon instead of stretching it in a frame.

Parimony (Lat. *parcimonia*). The Law of, in logic, the principle that complex powers, principles, or causes are not to be postulated without necessity, but that the simplest hypothesis is to be preferred. The law is enunciated by Wm. of Ockham in the famous phrases—*Entia non sunt multiplicanda præter necessitatem*. *Krusstra fit per plura quod fieri potest per pauciora*. The first maxim is aimed at the hypostatizing of abstractions, an error which he attributes to the Realists. See HYPOSTASIS NOMINATIM.

Pardo-Bazan, Countess Emilia (1852-1921), Sp. novelist and critic, b. at Corunna, Galicia, married Don José Quiroga of Orusco (1866). Her title was granted by Alfonso XIII, and she was the first woman to be made counsellor of public instruction. She wrote numerous novels, the best dealing with Galicia, books on Fr. and Russian literature and travel, and collections of short stories and essays. Her most outstanding works are *Un Viejo de novios* (1881) and *La Tribuna* (1885), both in the manner of Fr. realism, *Los Paños de Ulloa* (1886), a vivid portrayal of Galician country life, and *La Madre Naturaliza* (1887). See life by E. González López, 1944.

Pardoe, Julia (1806-62) Eng. novelist, b. at Beverley, Yorkshire. She visited Portugal and wrote on her return *Travels and Traditions of Portugal* (1833). A visit to Constantinople supplied material for *The City of the Sultan* (1836) and *A Romance of the Harem* (1839), and after going to Hungary she wrote *The City of the Magyar* (1839-40).

Pardon. In the United Kingdom the home secretary in the exercise of the royal prerogative (see CROWN) has the right to pardon offenders against the criminal

law. A P. cannot be granted where private interests are mainly concerned in the prosecution of the offender (a principle which explains the obsolete rule that the Crown could not pardon a man 'appealed' of felony). For example, the Crown will not pardon a common nuisance while it remains unabated. Again, under an Act of Charles II., the Crown cannot pardon a person guilty of committing a man to prison out of the realm. It is the better opinion that the king cannot pardon where the effect would be to nullify the effect of a recognisance to keep the peace; nor again is it the practice to pardon a contempt of court to the prejudice of the rights of a subject. A P. may be absolute so as to put the offender in the same position as if he had been innocent all along, or conditional, e.g. when a person sentenced to death is pardoned on condition that he submit to having his sentence commuted to penal servitude. In form a P. is granted by warrant under the great seal (q.v.) or under the sign manual. Under the Act of Settlement no P. under the great seal can be pleaded to an impeachment by the Commons. In the U.S.A. the constitution gives the president the power to pardon offences against the U.S. Gov. except in the case of the impeachment of public officers.

Paré, Ambrose (1509-90), Fr. surgeon, b. at Laval in Maine, France. Although his parents were poor he went to study surgery at Paris. He gained a great reputation during the Fr. campaigns in Italy, and was made surgeon in ordinary to Henri II., and he held the same office until his death. P. is considered to be the father of modern surgery.

Parent and Child. By Eng. law the complete relation of P. and C. exists only where the child has been born in lawful wedlock or where it has been legitimated by the subsequent marriage of the parents (see LEGITIMATION). There is no obligation on either parent at common law to maintain a legitimate child, though indirectly he or she could be compelled to do so through the old Poor Law Statutes, the Vagrancy Acts, and the Cruelty to Children Acts (see CHILDREN ACTS, 1908, 1933). An illegitimate child, whose parents have not married each other, is primarily maintainable by its mother, though if its paternity be proved an affiliation order can be obtained against the putative father compelling him to pay for the child's maintenance and education a sum not exceeding 20s. a week, until the child is sixteen. No person is required as father of an illegitimate child to give information concerning its birth, and the registrar of births and deaths may not enter in the register the name of any person as father of the child unless at the joint request of both parents. The effect of the Poor Law statutory obligation as rendered by the National Assistance Act, 1948 (section 42) is that a husband is bound to support all his wife's children, whether legitimate or illegitimate, which she had when she married him, in addition to those he himself may beget by her.

Legitimate.—Legitimacy by birth depends on the lawful marriage of the parents and the fact that the child was born in wedlock, though it is immaterial how soon after the marriage the birth takes place. In Scots law the position has for long been that children otherwise illegitimate may be legitimated by the subsequent marriage of their parents. The prin. effect of legitimacy is the right of the child to inherit and take his parents' real estate and personal estate respectively, though there is nothing to prevent the parent from willing away from his own issue the whole of such property as does not form the subject of a settlement. The other results of legitimacy are the right to bear the father's name, and, to the extent indicated above, the right to be maintained, educated, and protected. The parents are the natural guardians of their children, and their control endures in ordinary circumstances until the child reaches twenty-one or marries under that age. But the father is the legally favoured parent, a pre-eminence the principle of which found its strongest expression in the *patria potestas* of the Rom. father of an agnatio family (see *HEIR*). In England the father has the right to the custody and control of the children, not only as against third parties but against the mother, even though the child be at the breast; but this exclusive right of the father has been so far modified by the Divorce Acts and the Infants Custody Act, 1873, that the court will, on the mother's petition, give her either access or complete control where it is clearly for the benefit of the child to do so. Under the Guardianship of Infants Act, 1886, the mother has the right to appoint by deed or will a guardian to act after her death, who will be entitled to act either alone or jointly with any guardian the husband may have appointed. The Adoption of Children Act, 1926, however, provides for the adoption of infants by applicants who must not themselves be under twenty-five years of age nor less than twenty-one years older than the infant they are applying to adopt. Before granting an adoption order the court must be satisfied that every person (and this includes the natural parents) whose consent is necessary to the order both consents to and understands the nature and effect of an adoption order and, in particular, that the effect will be permanently to deprive him (her) of his (her) parental rights; and the court must also be satisfied that the order will be for the welfare of the infant. It is obvious that the only cases likely to arise are those in which the applicant(s) has already been maintaining the infant in his (her) own home. Prior to 1926 the law would not allow parents to enter into an agreement binding themselves to surrender the custody of their children; and if they had, in fact, given up control to third persons, they could at any time resume control subject to any doubt the court might entertain as to whether it would be for the child's benefit that it be taken away from the care of those who had

actually reared it. In any case, if the child has been brought up by another person, or is boarded out by Poor Law or equivalent authorities, the court may make an order on the parents, if it restores the custody to them, to pay such remuneration for the past maintenance as may be just. Where any dispute arises between the parents as to the question of custody, and the child, if a boy, is not less than fourteen years of age, or, if a girl, not less than sixteen, the court may allow the child to exercise a discretion and withdraw itself from the control of one or both its parents. Where the husband and wife have separated and drawn up a deed of separation, providing that the mother have access or full custody, the father will be bound by his agreement. Parents have a legal right to give or withhold consent to an infant child's marriage (see *INFANCY*); such consent must be given honestly and without any view to the parents' own private advantage. It is almost needless to say that the right is of no great value, and that the absence of consent will not invalidate a marriage ceremony which is otherwise good, whatever effect it may have in debarring the disobedient child from succeeding to property or from other material benefits.

Under the former Poor Law Act of 1601 there was mutual obligation of maintenance on children and parents; but though grandparents might be compelled to maintain pauper grandchildren, the converse did not hold good. But under the National Assistance Act of 1948 the only responsibility now is that of parents to children. By the Children Act, 1908, the wilful neglect on the part of a parent to provide his child with adequate food, clothing, medical aid, or lodging, or to take steps to procure the provision of the same from the Poor Law authorities (now the National Assistance Board), is misdemeanour, for which he may be punished either summarily by a fine up to £25, with or without imprisonment up to six months, or on indictment by a fine up to £100, with or without imprisonment up to two years. When an order for maintenance is made against a soldier husband, it must be sent to the War Office, which dept may then order a certain part of his pay to be deducted and appropriated to the support of his children. The absence of any civil obligation to maintain is important in connection with the liability of parents for necessities supplied to their children under twenty-one. A father who gives no authority, *a fortiori* who enters into no contract, is no more liable for goods supplied to his children than would be a mere stranger, though, of course, a jury is not unnaturally disposed, from his moral obligation to provide for his children, to infer an admission of liability in respect of such claims upon his children by tradesmen. But apparently mere knowledge on the part of the father that his child was being maintained by a stranger will not be enough to fix him with the liability to pay for the necessities supplied by the stranger on the ground of tacit

acquiescence; it would be otherwise if he had deserted his child or it was in a destitute state, for in such cases the law always implies a liability to repay a stranger for necessities supplied.

Before the Elementary Education Act, 1876, it was not obligatory on a parent to have his child educated. Under that Act it is his duty to cause it to receive efficient elementary education in reading, writing, and arithmetic, subject to any reasonable excuse for not sending his child to school, e.g. on the score of ill health (*see further under EDUCATION*). Rich and poor fathers are alike in this, that neither is legally bound to do more than cause his child to receive a statutory elementary education. If, however, the child is under the custody of guardians, the latter are bound to educate him in a manner becoming his rank and station in society. Again there is no obligation on a parent to bring up his child in any particular religious creed, or indeed to instil any religious views in him at all. The father, however, has the right to choose in what religion the child is to be educated, *even though it be illegitimate and un-legitimated*, and he cannot release this right nor bind himself conclusively to bring his child up in a particular faith, for the right is to be exercised not for his but for the child's benefit. Apparently a father cannot directly secure in what religion his child shall be brought up *after his death*, but he can accomplish the same object by choosing the right testamentary guardian.

A father acquires no legal interest in any real or personal property that may be given or settled exclusively on his child, whether such property accrues to the child while under age or after majority. In ancient legal systems, like the Roman, children were unable for the most part to hold any property separately from their fathers (*see FIRM*). It seems a moot point whether a father is entitled to the earnings of his child. Much must depend upon the implied terms of any arrangement that may be supposed to have been made between them. If the father, after the child reaches a certain age, sends him out to work but undertakes to continue his board and lodging, it may be assumed that he does so only on the understanding that the child's earnings will be 'pooled' for the common benefit of the family. But there is nothing to prevent a child from making a formal contract with his father as to wages if he enters his father's service, and such contract would be enforceable against the father. Of course, if the father frees the child from his control he has no longer any hold over the child's earnings. A widow, being bound to support any children she may have who are under sixteen, has a similar right to their earnings (as to the law of succession on intestacy as between P. and C., *see under SUCCESSION, INTESTATE*). A child may make a gift to his parent, provided the gift is not tainted by any undue influence on the part of the parent; and conversely a parent's gift to his child gives the latter an exclusive property in the gift as if made over to him for valu-

able consideration. Further a voluntary settlement is binding on the parent, and can, if necessary, be specifically enforced by the children (*see also PORTIONS; LAND LAWS; MORTGAGE*). A child is under no legal obligation to support his parents, even though he may be in receipt of a handsome income and his parents be scarcely able to 'make both ends meet.' Prior to the National Assistance Act of 1948, if a parent became chargeable to the poor rate, his children, if able, could be made to contribute to his or her support; now, however, the responsibility for the maintenance of parents in case of need is upon the National Assistance Board, while the obligation to provide accommodation is upon the local authority.

If a daughter is seduced, her father, or mother, can bring an action for damages against the seducer, not directly for the seduction but for the loss of services consequent upon the daughter's becoming pregnant (if so) or sick. But it is essential for the parent to give some evidence, however slight, that the daughter did perform services for him (or her) of some kind. In regard to torts (actionable wrongs other than breach of contract) committed by children, e.g. libels, assaults, trespasses, negligence, the parent is liable only if he authorised the tortious act, or where it can be reasonably inferred that he must have known of and assented to its commission.

Illegitimacy.—As to the status of legitimacy and, inferentially, its converse, illegitimacy, *see LEGITIMACY; LEGITIMATION; BASTARDY*. By the common law an illegitimate child is *filius nullius* (the son of no man), and therefore has no parent on whom he has any claim or from whom he can derive any rights; but under the Legitimacy Act, 1926, an illegitimate child is on the same footing as a legitimate child, provided the parents are subsequently married to each other; but this statutory provision does not avail to legitimate a child whose father or mother was married to a third person at the time of the birth of the child. Even before this change, an illegitimate child was so far the legal child of his parents as to be able to take a bequest to a 'child or issue' if he had in his putative father's lifetime gained the reputation of being, in truth, the son (or daughter) of his father. It is the mother and not the putative father of an illegitimate child who has the care and right of custody of such child during nurture. The mother is bound so long as she remains unmarried or a widow to support her illegitimate children until they reach sixteen years of age. If she marries the husband becomes bound in her stead, though if the wife has separate property and the husband cannot support his family the wife must do so. *See also ADOPTION; BASTARDY; CHILDREN ACTS; CHILDREN, SOCIETIES FOR PREVENTION OF CRUELTY TO; GUARDIANS; INFANTS; LEGITIMACY; LEGITIMATION; REGISTRATION OF BIRTHS, DEATHS, AND MARRIAGES*. *See W. F. Eversley, Law of Domestic Relations* (6th ed.), 1937; G. Lushington, *Law of Affiliation and Bastardy* (6th ed.),

1936; and J. C. Hall, *Law of Adoption and Guardianship of Infants*, 1928.

Parents' National Educational Union, founded by Charlotte Mason in 1888, is a non-profit-making society of world-wide membership, offering practical help to parents and others whilst providing a meeting ground for the study and discussion of educational problems. Members receive a monthly copy of the *Parents' Review*, and a leaflet giving reading and occupations for children under six, and may use the lending library. Available to the children of members is the Parents' Union School (conducted by correspondence) which plans a common curriculum in all usual subjects for children aged six to eighteen working in P.N.E.U. schools, classes, and families. The Charlotte Mason College, Ambleside, Westmorland, offers a three-year training in P.N.E.U. methods of teaching. Address: P.N.E.U., 171 Victoria Street, London, S.W.1.

Parentucelli, Tommaso, see **NICHOLAS (popes), Nicholas V.**

Paras, Sir Bernard (1867-1949), Brit. historian and student of Slavonic languages and literature educated at Harrow and Trinity College, Cambridge. He was a univ. extension lecturer at Cambridge and, at various times, at London, Oxford, and Liverpool. He first visited Russia in 1898 and, subsequently in 1906 and often in later years, acquired a wide knowledge of Russian political and social life before the 1917 revolution, his relations with the moderates enabling him to exercise some influence on the development of the Duma, in which he was appointed a gentleman usher. His views on Russian constitutional advance at this period are given in his *Russia and Reform* (1907). Appointed reader in Russian hist. at Liverpool Univ. (1906), he was prof. of Russian hist., language, and literature there from 1908 to 1917. But in the meantime he spent much of his time in Russia and, in 1914, with the consent of the Tsarist Gov., was appointed a Brit. observer with the Russian forces, describing his experiences in *Day by Day with the Russian Army* (1915). K.B.E. in 1919, he was appointed to a chair of Russian in London Univ. in the same year; he developed, and became the first director of, the School of Slavonic and E. European Studies there. In 1925 he pub. his *History of Russia* and, in 1931, *My Russian Memoirs*, which latter served to show how he had tried to inculcate among Russian liberal reformers the Eng. concept of parl. gov. and how fundamental was his divergence from the Bolshevik outlook, a divergence which had long barred him access to the new Communist Russia. His chief work is *The Fall of the Russian Monarchy* (1939), based on a careful examination of documents, memoirs and interviews, and his previous experiences in Russia, and considered the best existing narrative, from the liberal standpoint, of the causes and earlier incidents of the October Revolution. During the Second World War he lectured and broadcast on Russia in America and Canada, and in 1944 pub. a

'Penguin' book on *Russia and the Peace*, which followed a 'Penguin Special' on *Russia*. Other works: *Letters of the Tsar and Tsaritsa* (ed. Eng. trans. 1924), and a trans. of Griboedov's comedy *Gore of Uma*, under the title of *The Misfortune of being Clever* (1925); and *Moscow admits a Critic* (1936).

Paralysis, see under **PARALYSIS**.

Parhelia and **Paraselenae**, see **MOCK SUNS AND MOONS**.

Parl, see **PERI**.

Paria, Gulf of, inlet of the Caribbean Sea, between the is. of Trinidad and the mainland of Venezuela.

Pariah, name given to the lowest class of the pop. of India, which, not belonging to any of the castes of the Brahminical system, is shunned even by the lowest Hindu, as touching a P. would render him impure.

Parian Chronicle, see under **ARUNDEL MARBLES**.

Paridae, see **JACANA**.

Paris: 1. Famous pantomime of Domitian's reign, was a native of Egypt. He was a great favourite both with the emperor and the people, but was put to death for intriguing with the emperor's wife, Domitia. 2. Famous pantomime of Nero's reign. He was a great favourite of the emperor, who declared him to be freeborn though originally a slave of Domitia; but when Nero attempted to become a pantomime he caused P. to be put to death, deeming him a dangerous rival. See Tacitus, *Annals*, xlii.

Paris (also called Alexander), second son of Priam and Hecuba. When he was born he was exposed on Mt. Ida, but was brought up by a shepherd; he became a great defender of flocks and shepherds, and received the name of Alexander, or defender of men and flocks. Discovering his origin, he was received by Priam and married Hecuba, but deserted her for Helen. He was called upon by Zeus to decide as to which was the fairest, Hera, Athena, or Aphrodite. Hera offered him the sovereignty of Asia, Athena renown in war, and Aphrodite the fairest woman for his wife. He decided in favour of Aphrodite. She took him to Greece and he was received by Menelaus in his palace at Sparta. He carried off Helen, the wife of Menelaus, and the most beautiful woman in the world. From this arose the Trojan war, and all Helen's former suitors sailed against Troy. P. was defeated by Menelaus, but was carried off by Aphrodite. Having killed Achilles, he was wounded, on the capture of Troy, by Philoctetes with one of the arrows of Hercules. He returned to his wife, Hecuba, but she refused to heal him and he died. Hecuba, remorseful, thereupon ended her life. P. is represented as a beautiful beardless youth with a Phrygian cap.

Paris, Alexis Paulin (1800-81), Fr. savant, b. at Avonay (Marne). He pub. in 1824 *Apologie de l'école romantique*. In 1828 he was appointed to the dept. of MSS. in the Bibliothèque Royale. During 1830-36 he completed a Fr. trans. of Byron's works in 13 vols., and from 1836

to 1848 he compiled a valuable catalogue of the *Manuscrits français de la bibliothèque du roi*, which has formed the basis of all subsequent works on early Fr. literature. P. was the first to occupy the chair of medieval literature founded at the College de France in 1853. On his retirement he was made an officer of the Legion of Honour.

Paris, Gaston Bruno Paulin (1839-1903), Fr. scholar, son of Alexis Paulin P., b. at Avenay (Marne). He studied at Bonn, at Göttingen, and at the École des Chartes. In 1865 he won his doctor's degree by a thesis on the *Histoire poétique de Charlemagne*. He founded, with P. Meyer, C. Morel, and H. Zotenberg, the *Revue critique* in 1866, and with P. Meyer in 1872 the *Romania*. His connection with these two journals was in great part the cause of the revival of scientific study in France. Among P.'s works may be mentioned *De Pseudo-Turpino* (1865), the *Vie de Saint-Alexis* (1875), the *Petit Poucet et la grande course* (1875), and the *Littérature française du moyen âge* (1888, 1890). He succeeded his father as prof. of medieval Fr. literature at the Collège de France in 1872, of which he was appointed director in 1895.

Paris, Louis Philippe Albert, Comte de (1838-94), son of the Duc d'Orléans, eldest son of King Louis Philippe. On the deposition of Louis Philippe and the proclamation of the republic, the Orléanists were driven into exile, the family finally settling at Claremont, Surrey. The Comte de P. travelled with his brother, the Duc de Chartres, for some time in the E. In 1861 the brothers proceeded to the U.S.A., and joined the staff of Gen. McClellan. They were present at the siege of Yorktown and the fight at Williamsburg, and took an active part in sev. other engagements. Returning to Europe, he married in 1864 the Princess Marie Isabelle, daughter of the Duc de Montpensier, a son and heir being born at York House, Twickenham, the following year. At the declaration of the war in 1870 he was refused service in the Fr. Army. On the fall of Napoleon III. he returned to France, and by the death of the Comte de Chambord in 1883 became head of the house of Bourbon. Through the passing of the law of expulsion by which direct claimants to the throne of France were banished from the country, he was again forced to seek refuge in England, and resided quietly for some years at Richmond, where he died. His *History of the American Civil War* appeared in 8 vols. in 1874-75.

Paris, Matthew (c. 1200-59), Eng. historian and monk, entered the monastery of St. Albans in 1217. He succeeded Roger of Wendover as chronicler to the monastery (1236), and carried on the *Chronica Majora*, a hist. from the creation down to 1259, from the summer of 1235. He visited Norway in 1248, but returned to England in 1249. He was the best Lat. chronicler of the thirteenth century, his style being vigorous and bright; and his writing is of historic value, giving as it

does information derived from leading actors in contemporary events. He also wrote *Historia Anglorum*, a summary of the chief events between 1200 and 1280. The standard ed. of the *Chronica Majora*, by Dr. J. Ward, was pub. in the Rolls Series (1872-83).

Paris, anc. Lutetia, cap. of France and of the Seine dept., of whose area it occupies over one-sixth. It is built on both banks of the R. Seine, about 100 m. from its mouth, in two unequal parts, with the Ile de la Cité in the centre. On the r. b. it is enclosed by a sweep of low hills known as the Collines de P. On the l. b. are the Butte aux Cailles, Montsouris, Montionge, and Mont Ste Genevieve. The outer boundary is formed by the plains of Grenelle and Vaugrard. The rising ground in the suburbs was once the site of forts, now dismantled. The area at present occupied by the Bastille and the *hotel de ville*, known as the Marais, was, for a long time, under water. Of numerous islets there now remain only the Ile de la Cité, the Ile aux Vaches, now called St. Louis, and the Ile de la Conférence, on which is built the Auteuil viaduct. Its height above sea level varies from 85 ft. to 110 ft., the highest point being the hill of Montmartre. Geographically it occupies an important position, being situated in a fertile plain, on ground of recent alluvial formation, near the confluence of the Oise, the Marne, and the Yonne with the Seine, and, what must have been of almost equal importance in early days, just at the point where the natural highway from the Mediterranean to the ocean is joined by the route from Aquitaine and Spain. The climate is temperate. The highest recorded temps. were 38° C. in 1874 and 1949; the lowest was -21° C. in 1929. P. has an area of 40 sq. m. It is 240 m. from London by air, Le Bourget-Northolt, and 285 m. by rail and sea, Calais-Dover. Pop. of the city, 2,725,400; of the dept. of Seine, which covers P.'s outer suburbs, 4,775,700.

Administration.—The municipal government of P. is under the prefect of the Seine dept. and a municipal council, which is elected and which in turn elects a president. The twenty mayors of the twenty arrons. into which P. is divided, who assist the prefect in certain services, are, however, civil servants, appointed by the Ministry of the Interior. There is a justice of the peace for each arron. The police are under a separate functionary, the prefect of police, both he and the prefect of the dept. are appointed by the gov. The *Juges de la paix* (justices of the peace) hold their courts at their respective *mairies*. A tribunal of 1st inst. sits at the Palais de Justice. The Cour de Cassation, which siffs cases before their actual trial, and the Tribunal de Commerce, also sit at the Palais de Justice. P. is also the seat of the courts of first instance and appeal. It is the seat of the president of the republic, who resides at the Palais d'Elysée. The Chamber of Deputies is housed at the Palais Bourbon and the Senate at the Palais de Luxembourg.

The Conseil L'Etat and the Cour des Comptes also sit in P.

P is the seat of an archbishopric, whose titular, normally a cardinal, is primate of the Ile de France. He has under his jurisdiction ninety-four par. churches, the Institut Catholique, nineteen eccles. communities, fifty-four religious houses, and one seminary. There are more than a hundred religious buildings of various other denominations and nationalities. P has thirty-eight hospitals, besides a number of foreign charitable institutions and private clinics. The cemeteries include that of Père Lachaise, where the marshals of France are buried, and such

There are also two municipal colleges and more than 2000 primary schools, besides a number of private educational establishments. Twenty-one national museums are controlled by the Ministry of Education, two by the Institut, and seven by various private bodies. The most important is the Musée de Louvre, one of the finest in the world, and the Musée Carnavalet, which specialises in the history of P. Among the 15 libraries and archives of P the most important is the Bibliothèque Nationale. It possesses 5,000,000 printed books, 3,000,000 prints, 200,000 manuscripts, and 130,000 MSS. The Bibliothèque de l'Arsenal houses the Rondel Collection,



PARIS THE LEFT BANK AND THE QUAI D'ORSAY FROM THE RIVER
On the left is the Gare d'Orsay, on the right the Sofarino and Cane buildings.

famous writers as Balzac, de Musset, and Oscar Wilde. There are a number of prisons, but the famous one of St Lazare has been demolished.

Five official academies form the Institut. Their headquarters are at the Hôtel Quai Conti, formerly the Collège des Quatre Nations. The most famous is the Académie Française, founded by Richelieu in 1635. The others are the Académie des Inscriptions et Belles Lettres, the Académie des Sciences, the Académie des Beaux Arts, and the Académie des Sciences Morales. The Académie de Médecine is at the Faculté de Médecine at the Sorbonne. The unit, governed by a rector, is also at the Sorbonne, together with the various faculties and the Ecole Normale. The minister of education is styled grand master of the university. There are faculties of Protestant theology, law, medicine, letters, and pharmacy. Teaching is supervised by the faculties in sixteen lycées and ten extra-mural lycées.

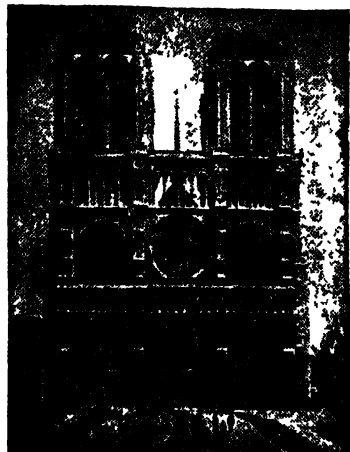
dealing especially with the theatre, and the Bibliothèque Mazurine possesses a collection of 900 manuscripts. There are numerous places of amusement. The national theatres include the Opéra National and the Opéra Comique, the Comédie Française and the Théâtre Populaire.

There are six railway termini in P, including the Gare du Nord, Gare de Lyon, and Gare St Lazare. For internal traffic there are the Métropolitain and the Chemin de Fer de Ceinture besides an extensive motor bus service. There is an air port at Le Bourget linking P with all parts of the world. The principal markets are at the Halles Centrales. The district around P supplies it with much of its food, and P manufactures jam, automobiles, beer, boots and shoes, and refined sugar. There are also luxury manufactures such as jewellery, dresses, furs, clocks, engravings, dress trimmings and ornaments, embroidery, tapestry, porcelain, etc.

History.—The Île de la Cité, largest of the Seine is., was the nucleus of modern P. Before the Rom. conquest of the country, a small tribe of Gauls, known as the Parisii, settled there. The Romans called the is. Lutetia, and built a camp there, and in 52 B.C. the country came under Rom. rule. The settlement began to spread on to the l. b. of the Seine. Caesar placed the tn. and the region under the command of Labienus. A city was erected on this bank, large enough to contain massive arenas (excavated in 1856), but by the end of the third century barbarian invasions forced the inhab. back to the is. St. Denis and his companions, Rusticus and Eleutherius, were the first to introduce Christianity, towards the end of the third century, having been sent by the pope. St. Martin continued their work in the fourth century. P. was the cap. of Constantine Chlorus, who had a palace there. In 410 P. joined the Armorican league. Attila attempted to enter P. in 451, but halted at the prayer of St. Geneviève, who became patron saint of the city. This incident is commemorated by Laudowski's statue of the saint on the Pont de la Tournelle and is illustrated in one of the frescoes in the Panthéon. In the Frankish invasion P. was captured by the Merovingian king (Clovis (481-511), who made P. his cap. in 508, frequently residing there. After his conversion to Christianity he built the basilica of St. Peter and Paul. Chilperic removed his cap. from P. in 567, and for the remainder of Merovingian rule P.'s hist. is sombre, except for the brilliant reign of Dagobert the Great (628-38). Charlemagne (768-814) succeeded the Merovingians. P. had only grown slowly under the Frankish kings, though the civil power of the church had greatly increased, and trade and the guilds were flourishing. Charlemagne made P. a co., and it became a duchy under Charles the Bald. In 845 the Norsemen reached P. by the Seine and laid waste the city, sucking its monasteries and churches. The city stood a forty-five-month siege against them in 885, led by Bishop Gozlin and Count Eudes. In 892 the Norsemen were routed by Eudes, and they never again captured P. Under the Capetians, the line that was to reign until the revolution, commencing with Hugh Capet in 987, P. became the permanent cap. of France. Their palace was in the Cité, where the Palais de Justice now stands, the towers of the Conciergerie being remains of it. Louis the Fat marked out the second line of walls; these included the *faubourgs* of the l. b. In the reign of Henry I. (1031-60) the church of St. Martin des Champs, burned by the Norsemen, was rebuilt. The reign of Louis VI. (1108-37) was marked by a great expansion of P., and the great abbey of St. Victor and a nunnery at Montmartre were among the buildings erected. Between 1180 and 1213 Philip Augustus began the paving of P. and the building of its third wall. The wall was 8 ft. thick, pierced by twenty-four gates, and fortified by about 500 towers. A part remains to-day. Besides this he built the

Louvre, a moated château, parts of two wings of which are incorporated in the present palace, and the remainder may be traced. The Louvre was originally a hunting lodge before the name came to signify any royal residence. Two great warehouses at the old market at Champignons, the origin of Les Halles, were also the work of Philip Augustus. It was in this reign, too (in 1182), that the choir of the cathedral of Notre Dame was completed, the first stone having been laid by Pope Alexander III. twenty years earlier. The whole building, however, was not finished until the end of the thirteenth century.

P. had by this time become the intellectual centre of Europe. In the first



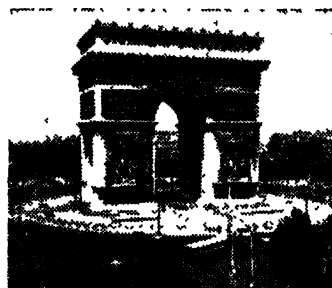
NOTRE DAME

E.N.A.

half of the thirteenth century the various schools organised themselves, thus giving to the univ. its definite character. P. Univ. was soon made famous by Peter Lombard, Abelard, and Sorbon, who gave his name to the Sorbonne. Louis IX., the Saint (1226-70), built the beautiful Sainte Chapelle, famous for the magnificence of its structure and its stained glass. He founded many monasteries and abbeys, as well as the Hôtel Dieu. Philip the Fair estab. the Parlement, the chief legal tribunal of the kingdom, which he housed in his palace of the Cité. In 1302 the Third Estate met with the States-General for the first time, to discuss the question of the temporal supremacy of the pope. In the reign of Philip VI., who succeeded to the throne in 1328, and in the succeeding reigns, France became the scene of Eng. invasion. In 1346 the *faubourgs* were laid waste. Some order was restored at the accession of Charles V. (1364), a great builder and art patron; the fourth wall around P. was built, which included the first buildings on the r. b. As the

Louvre was no longer part of the defences of P., he transformed it into a sumptuous palace; he also founded the first royal library. To him are also due the beautiful chapel of Vincennes and the raising of the Bastille. The minority and reign of Charles VI. (1380-1422) was a period of deep misery for P. The rivalry of the Armagnacs and Burgundians divided P. into two factions, and the Eng. occupied it, being driven out in 1446. P. then enjoyed a period of calm. During the reign of Charles VIII. the Petit Pont and the Pont Notre Dame were rebuilt; the latter replaced the previous wooden bridge in 1499, the houses on the new bridge being the first in P. to be numbered. Francis I. in 1528 began the building of the Louvre des Valois, and founded the Collège de France. Religious wars broke out in France, culminating in the massacre of St. Bartholomew's Eve in Aug. 1572 when, possibly at the instigation of Catherine de' Medici, the Huguenots in P. were murdered by the Rom. Catholics. Only after Henry IV.'s conversion to Rom. Catholicism in 1593 was peace restored, P. having suffered two sieges during the course of the wars. Catherine de' Medici had had erected the Petite Galerie on the S. of the Louvre, and had begun in 1564 the palace of the Tuilleries. Henry elaborated a vast scheme for finishing the Tuilleries, quadrupling the size of the Louvre, and joining the two palaces by continuing the Grande Galerie to the W. He practically completed the *hôtel de ville*, built the N. portion of the Pont Neuf, and incorporated the two islets W. of the Cité with the is. Under Louis XIII. building began on the Île St. Louis. The palace of Luxembourg, built by Marie de' Medici, was begun in 1615. Richelieu commissioned Lemerle in 1624 to complete Henry IV.'s scheme for the enlargement of the Louvre. Lemerle also designed the Hôtel Richelieu, which was later extended by Anne of Austria and remained the Palais Royal. In 1614 Louis XIII. laid the first stone of the first bridge from the Île St. Louis, to the N. bank. P. again suffered internal dissension, culminating in the wars of the Fronde (1648-52) against Mazarin; but order was eventually restored to the advantage of the royal power. During Louis XIV.'s minority the building now known as the Institut de France was built as the Collège des Quatre-Nations, and also the Hôtel Mazarin, now the Bibliothèque Nationale. Louis XIV. was responsible for many magnificent buildings. During his long reign much of medieval P. was demolished. He finished the N. wing and riv. front of the Louvre. Other buildings completed during his reign were the two domed churches of St. Louis des Invalides and the Val de Grâce. The Porte St. Martin and the Porte St. Denis were transformed into triumphal arches. During this reign the court resided at Versailles and the pop. of P. insensibly lost their loyalty to the person of the king. Under Louis XV. huge buildings arose: the Place Louis XV. (now the Place de la Concorde) and the church which

was later secularised as the Panthéon. But for thirty years of Louis XV.'s reign nothing was done towards the completion of the Louvre, nor was there really much progress in P. during his or his successor's reign. Louis XVI. began the fifth circuit enclosing P. (1786). The revolution started in 1789 with the storming of the Bastille and its destruction. The principal events of the revolution took place in P., Louis XVI. being guillotined there in 1793. Thousands of executions followed, but P. regained a degree of calm under the Directory and the Consulate, and the period of neglect and destruction came to an end. In 1795 Bonaparte opened fire from the steps of the church of St. Roch on the royalists who were marching against the Convention. He soon rose to power, and became emperor of the Fr. in 1804, being crowned at Notre Dame in the presence of Pius VII. Napoleon commenced the modernisation of P. Perreault's colonnade to the Louvre was



ARC DE TRIOMPHE

E.N.A.

restored, the four façades of the quadrangle completed, and the Pont des Arts built. The two triumphal arches in the Place du Carrousel and the Place de l'Etoile were erected by Napoleon, though the latter, the Arc de Triomphe, was not completed until the reign of Louis Philippe. It is notable for its magnificent group sculpture by Rude, 'The Marsillaise.' The quays on the S. bank of the Seine were also built under Napoleon, and he ordered the church of the Madeleine, begun in 1761, to be completed as a Temple of Glory; it was not, however, finished till 1842, when it became a Catholic church. He drove sixty new streets through the city. In 1815 Napoleon was finally defeated. The sixth circuit was begun in 1818. There was a three-day revolution in P. in 1830, when Charles X. was deposed. This was commemorated by the bronze Colonne de Juillet in the Place de la Bataille. Louis Philippe's reign also ended in revolution which led to the estab. of a republic. Between 1815 and 1818 the basilicas of Notre Dame de Lorette and St. Vincent Paul were erected, as well as many bridges, and fifty-five new streets were laid. The

columns on the Place de la Concorde and the Place de la Bataille were raised, but the greatest architectural event of the period was the careful restoration, by Viollet le Duc, of Notre Dame and the Sainte Chapelle. In 1852 Louis Napoleon was proclaimed emperor. The seventh circuit, known as that of Thiers, was begun in 1841 and finished in 1869. In 1857 the N. façade of the Louvre was completed. The great changes which have made the modern P. were effected during the Second Empire under Baron Haussmann, prefect of the Seine from 1853. All remnants of medieval P. were swept away. Over £34,000,000 were spent then on making twenty-two new boulevards and avenues. Haussmann's idea was to raise the height of P. instead of allowing it to continue to spread outwards. P. was besieged by the Gers. during the Franco-Prussian war from Sept. 1870 to Jan. 1871, and the city suffered bombardment, damage, and famine. After the peace a civil war known as the Commune was waged in P., in which the *hôtel de ville* and the Tuilleries were destroyed. The Eiffel Tower was constructed for the exhibition of 1889; that of 1909 marked the extension of P. into the plain of Grenelle. Under the Third Republic the new *hôtel de ville*, the new Sorbonne, the Trocadéro, the Opéra, and the church of the Sacré Cœur were built. In 1937 the Palais de Chaillot replaced the old Trocadéro. During the First World War P. suffered air raids and was threatened with attack in Aug. 1914. A military governor was appointed and the seat of government removed to Bordeaux the following month. The battle of the Marne drove the Gers. away from the cap. Reinforcements were sent to the battlefield from P. in taxicabs. The gov. returned to P. in Dec. 1914. From 1916 to 1918 P. was attacked by 'Big Bertha.' In July 1919 an allied victory march through P. celebrated the signing of the treaty of Versailles, and on Nov. 11, 1920, the body of an unknown soldier was buried under the Arc de Triomphe. Between the two world wars some blocks of luxury flats in the W. of P., and some thirty new churches, products of the Catholic revival of the 1930s, were the prin. new buildings, apart from those already mentioned. Overcrowding has, however, been one of the social and economic effects of the wars.

In June 1940 Ger. troops occupied P., the Fr. having withdrawn to spare it from devastation. In May 1941 a Ger. municipal councillor was appointed commissioner for P. Allied planes made numerous raids on the factory suburbs of P., notably a heavy night attack by R.A.F. bombers on the Renault works at Billancourt in March 1942. In Aug. 1944 Gen. von Choltitz surrendered P. to Gen. Leclerc, after some bitter fighting had occurred between Fr. partisans and Ger. troops (see further under WESTERN FRONT IN SECOND WORLD WAR). P. had suffered little damage during the war, but nevertheless was faced in 1945 with a

severe housing problem, since there had been no building done since 1939. New buildings were commenced both in the centre of P. and in its suburbs, and a number of Metropolitan stations were named after war personalities or incidents, e.g. Franklin D. Roosevelt. P. remains a most beautiful city, with its wide streets, gardens, squares, and impressive buildings, representing the artistic evolution of a whole nation.

Present-day Paris.—The whole of P. was once surrounded by fortifications comprising three distinct lines of defence: the inner ramparts were demolished between the world wars. Beyond these there are separate rings of detached forts on the surrounding heights, the outer ring extending for about 75 m. and at about 8 m. from the ramparts, the intermediary forts varying in distance from the outer from 2 to 5 m. The inner line of fortifications confines P. to something roughly resembling a pear in shape, with the stalk towards the W., and the Cite and the Ile de St. Louis, on the bend of 7 m. which the Seine makes in its five hour flow through the city, for core. The riv. flows between broad stone embankments, being spanned by thirty-two bridges in its course. The greater part of the Cite is occupied by five buildings: Notre Dame, the Palais de Justice, to which a new wing was added in 1911-14, the Sainte Chapelle, the Prefecture de Police, and the Tribunal de Commerce. The Ile de St. Louis is known now as one of the most peaceful quarters of P. These is., and across the riv. on either hand the busiest part of P., are found within the circuit of the boulevards, the broad, tree-planted thoroughfares which have replaced the ramparts of Louis XIII. on the N. and of Philip Augustus on the S. Within this boundary and on the N. or E. b. of the riv., the following are among the chief points of interest: the Louvre; to the W. between its N. and S. wings is the Place de Carrousel, with the Arc de Triomphe, and stretching W. again the Jardin des Tuilleries and the Place de la Concorde. Outside the circuit of the boulevards are the Champs d'Elysées, and between the Louvre and the gardens is the site of the Tuilleries. In a straight line with the Champs d'Elysées is the Arc de Triomphe in the Place de l'Etoile, from which sev. avenues radiate. S. of this line, still on the E. b. of the riv., is one of the most fashionable residential areas. To the N. of the Jardin des Tuilleries are the Ministry of Marine, the Ministry of Justice, and the Vendôme Column; to the N. of the Louvre the Palais Royal, the Bibliothèque Nationale, and the Bourse. E. of the Louvre are the Galles Centrales, the Tour St. Jacques, the *hôtel de ville*, the site of the Bastille, and the Bibliothèque de l'Arseanal. N. is the Hôtel de Rohan, the Hôtel Carnavalet, and the Musée Victor Hugo. In the dist. N. of the Seine and beyond the portion already described the prin. points of interest include the following: just beyond the boulevards the Madeleine and the New Opera House. Further N. is the 'artists'

quarter' of Montmartre. About 1 m. beyond the boulevards to the E. is the cemetery of Pere Lachaise, and in the N. suburbs the abbey of St. Denis, containing the royal tombs. In St. Denis and Aubervilliers are the cap.'s worst slums. N. P.'s suburbs are mainly industrial, particularly in the N.E. On the S. bank of the Seine and within the space formerly enclosed within the walls of Louis Philippe is the Quartier Latin in which are to be found the various buildings of the univ. of P., the Institut, the Musée Cluny, the Panthéon, and the churches of St. Severin and St. Étienne du Mont. Between the two world wars a new univ. residential quarter was erected beyond the Porte D'Orléans, known as the Cité Universitaire, with different buildings to house the students of different nationalities: Collège France-Britannique, Collège au Japon, etc. Beyond the old Quartier Latin to the W. are the École Militaire and the Champ de Mars, with the Eiffel Tower facing the Palais de Chaillot on the opposite bank of the riv. A little to the E. of these is the Hôtel des Invalides, and on the riv. bank close to the boundary the École des Beaux Arts; and S. of that the Palais du Luxembourg with its beautiful gardens, and to the E. on the riv. bank the Jardin des Plantes just outside the old ramparts are the Bois de Boulogne on the W. and the Bois de Vincennes on the S.E.

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Paris: 1. City of Texas, U.S.A., the co. seat of Lamar co., 93 m. N.E. of Dallas. It has cotton-seed oil mills, and a cotton-oil refinery. Pop. 18,700. 2. City, the co. seat of Edgar co., Illinois, 19 m. from Terre Haute. It is in a rich farming region. Manufs. brooms. Pop. 9300. 3. City of Kentucky, co. seat of Bourbon co., 18 m. N.E. of Lexington. Pop. 6700. 4. City of Tennessee, co. seat of Henry co., 95 m. W. of Nashville, situated in a fertile agric. region, in which cotton and tobacco are the chief products. Pop. 6400. 5. Tn. and port of entry of Braut co., Ontario, Canada, 30 m. W. of Hamilton. It has potteries, knitting mills, and oil refineries. Pop. 5000.

Paris, genus of herbaceous perennials (family Liliaceae), with a stout rhizome

and erect stem, bearing four whorled net-veined leaves, and a solitary green flower followed by a berry-like fruit. The only Brit. species is the herb P., or truelove knot (*P. quadrifolia*) a rather uncommon plant found in woods. The berry is black. *P. polyphylla* bears yellowish-green flowers, which are succeeded by bright red berries. This is sometimes grown in gardens. Its perianth is normally in eight reflexed parts, four large and lanceolate, and the alternating four small and narrow.

Paris, Declaration of, see DECLARATION OF PARIS.

Parish. The term par., as used to-day in connection with local government, means no more, according to the Interpretation Act, 1889, than a place for which separate overseers can be appointed or a separate Poor Rate levied; but like all statutory definitions, that of par. is one of convenience only and not instruction. Originally the expression par. was properly of eccles. significance only; and though it has been suggested that the explanation of the origin of urb. pars. is involved in great obscurity, Blackstone's definition that a par. meant primarily 'that circuit of ground in which the souls under the care of one parson or vicar do inhabit' is probably as true of urb. as of rural pars. The difficulties arise from the fact that from quite early times the par. was regarded as being not only an eccles. but also a civil subdivision of the co., and that the legislature has generally dealt with the par. as the unit area, not only for Poor Law purposes but for local administrative purposes generally. In parts of England the par. for local government purposes remains practically coterminous with the old eccles. bounds; but in a great number of urb. dists., and especially the metropolis, many pars. have been grouped into one, or the term has been used to cover other areas which, though not historically pars. have a not dissimilar organisation. The result is that in many cases a particular area may be a par. for civil but not for eccles. purposes, while in other cases a particular area may be a par. for some civil purposes and not for others. Historically a par. denotes a circumscribed ter. varying in extent and pop., but annexed to a single church whose incumbent (q.v.) is entitled to the tithes (or other commuted payment) within that ter. The creation of pars. in England was gradual and not complete till shortly before the Conquest. Most historians concur in the theory that the Eng. parochial divs. arose chiefly from lay foundations, the differences in extent being accounted for by the varying limits appointed for them at their origin. The origin of these lay foundations is to be sought in the early inadequacy of the means of divine worship supplied by the bishoprics and monasteries, when the feudal lords began to build their own domestic churches and oratories for their families and tenants. The bishops consecrated these places and consented to the incumbent residing at the church and receiving the tithes and offerings of the

inhab. to whose use the particular church was limited, as well as any endowment which the founder happened to annex to it. The last concession made to the lay-founder was probably the advowson or right of presenting the clerk to the vacant living—a right which, by the primitive constitution of the church, belonged exclusively to the bishop; and when this concession was obtained, these united tithes differed in no material respect from most modern pars. See LOCAL GOVERNMENT.

Parish Clerk, see CLERK.

Parish Councils, see under LOCAL GOVERNMENT.

Paris, Lyons, and Mediterranean Railway, see under SOCIÉTÉ NATIONALE DES CHEMINS DE FER FRANÇAIS.

Paris, Treaties of, name given to various international peace treaties signed in P.; viz. the treaty signed Feb. 10, 1763, by Britain, France, and Spain at the end of the Seven Years war; the treaty signed on Sept. 3, 1783, between Britain and the Amer. commissioners, recognising Amer. independence; the treaty of May 30, 1814, between the Allies and France after the abdication of Napoleon; the treaty concluded on Nov. 26, 1815, between the same signatories after the final overthrow of Napoleon; and the treaty of March 30, 1856, signed by Great Britain, France, Turkey, Sardinia, and Russia at the close of the Crimean war. The peace conference after the First World War, which drew up the Versailles peace treaty, was held in P. in 1919–20; and the peace conference held in P. after the Second World War in 1946 drew up the peace treaties between the Allies and Italy, Hungary, Bulgaria, Rumania, and Finland.

Paris University, see SORBONNE.

Park, Sir Keith Rodney (b. 1892), airman, b. in New Zealand. In the battle of Britain he commanded No. 11 Fighter Group, which took a major part. He was then promoted to air officer commanding in Egypt (1942); in Malta (1942–1943); air officer commanding in chief in the Middle East (1944–45), and became allied air commander-in-chief, S.E. Asia (1945–46). He reached the rank of air chief marshal.

Park, Mungo (1771–1806), Brit. explorer, b. at Selkirk; he went to Edinburgh Univ., where he studied medicine and surgery, and distinguished himself as a botanist. In 1792 he went to Sumatra and there carried out certain botanical investigations, the result of which brought him into notice. In 1795 the African Association sent him to explore the course of the Niger, and this he did accompanied only by two servants. The journey was full of difficulties and set-backs. At one point he was imprisoned for four months by a hostile chief, and escaped with only his horse and his pocket compass. At last, in July 1796, he found the long-sought Niger, and followed the river downstream from Segu. But he was weak, hungry, and without means, and he had to turn back, finally collapsing with fever at Bamako after having traced the course

of the river for 300 m. Only the nursing of an African, in whose house he remained for seven months, saved his life. On his return in 1799 he pub. his *Travels* (see Everyman's Library), which achieved great popularity. He now estab. himself as a surgeon at Peebles, but the love of travel was too strong within him for such a life, and in 1805 he sailed for the Niger. This expedition was a much more ambitious one than the first and consisted of some seventy Europeans, including soldiers, artificers, draughtsmen, as well as native guides and carriers. They started, as before, from Pisanla, in the Gambia, but by the time they had reached the Niger only eleven Europeans were left alive; the rest had succumbed to fever and dysentery. P., however, was undeterred and determined to continue from where he had left off on his first expedition. With the help of the one soldier still capable of work, he built, out of two canoes, a serviceable boat which he called the *Joliba*, the native name for the Niger. Before setting sail in it with the poor remnants of his party he gave letters to a native guide to take back to the Gambia for transmission to England. One of these, addressed to the Colonial Office, ends on a note of high courage, to the effect that though all with him should die he would still persevere and if he could not succeed in the object of his journey he would at least die on the Niger. P. perished in the rapids at Bussa; but not before he and his companions had navigated a thousand m. of the river. The *Joliba* seems to have got into a wrong channel, struck a rock, and remained fast. Hostile tribesmen on the bank attacked with spears and arrows, and, either because they were unable to defend themselves, or because the boat was smashed under them, the occupants were swept into the water and drowned. Today at Pisanla there stands a monument commemorating this gallant Scotsman. See life by L. G. Gibbon, 1931.

Park, large enclosed piece of ground, usually with woodland and pasture, attached to a country house, or an enclosure in a tm. ornamentally laid out for public recreation. In England a bor. or urb. council has the power to purchase land for such a purpose, and there are few tns. that have not one or more public P's. Those presented by private individuals are usually maintained by the bor. or urb. council. The word is also used for a large tract of land kept in its natural state for the public benefit. Among the most famous P's, public or natural, may be mentioned Hyde P. in London, the Bois de Boulogne in Paris, the Tiergarten in Berlin, the Yellowstone National P. (q.v.) in the state of Wyoming, U.S.A., the Algonquin P. in Ontario, the Yosemite National P. in Central California, the Australian National P. at Port Hacking, the Rocky Mts. and Jasper P's in Alberta, and the Euro National Albert in the Belgian Congo, in which is Mt. Karisimbi (14,780 ft. high). But the great national P's. have nothing in common with a small Brit. public P. and may be more appro-

privately compared with the animal sanctuary at Whipsnade. Ps. like the Kruger National P. in S. Africa and the Buffalo and Wood Buffalo Ps. in Alberta are essentially game reserves, and in the Brit. and Belgian E. and central African dependencies there are many Ps. for the preservation of the fauna and flora of Africa. See also GAME RESERVE, NATIONAL PARKS.

Parker, see THUR AND PARKER

turned to New York and became an organist and choirmaster, and taught at the National Conservatory directed by Dvořák. Later he became organist at Trinity Church, Boston and in 1894 prof. of music at Yale Univ. He visited England sev. times for performances of his works at the festivals and to receive the Mus. D. from Cambridge in 1902. Among his works are (opera) *Mona and*



CHATSWORTH PARK, DERBYSHIRE

John H. Stone

Chatsworth House, a seat of the duke of Devonshire, was built by Sir William Cavendish in 1557, and rebuilt by the first duke between 1687 and 1707.

Parker, Sir Gilbert, first Baronet (1862-1932), Eng. politician and writer, b. at Camden E., near Addington, Ontario, Canada, and educated at Trinity Univ., Toronto. Conservative M.P. for Gravesend 1900-18. In the earlier half of the First World War, in charge of Amer. publicity P.O., 1916. He wrote poems, books of travel, and novels, among which may be mentioned *Round the Compass in Australia* (1892), *A Lover's Diary* (poems, 1894); and *The Land, the People and the State* (1910). Probably the most popular of his novels are *The Seats of the Mighty* (1896, which was dramatised and played at His Majesty's Theatre); *The Lane that had no Turning* (1900); and *A Ladder of Swords* (1904). Later works: *The World in the Crucible* (1915); *Wild Youth* (1919); *No Defence* (1920); *The Power and the Glory* (1925); and *The Promised Land* (1928). His autobiography, *... and so on*, appeared in 1927.

Parker, Francis William (1863-1919), Amer. organist and composer, b. at Auburn, Mass., U.S.A. He studied at Boston and at Munich, where he was a pupil of Rheinberger. In 1884 he re-

turned to New York and became an organist and choirmaster, and taught at the National Conservatory directed by Dvořák. Later he became organist at Trinity Church, Boston and in 1894 prof. of music at Yale Univ. He visited England sev. times for performances of his works at the festivals and to receive the Mus. D. from Cambridge in 1902. Among his works are (opera) *Mona and*

Fairyland; (oratorios) *The Legend of Saint Christopher* and *The Dream of Mary*.

Parker, Sir Hyde (1711-16. 1783), Eng. admiral, b. at Tredington, Worcestershire. He commanded the Brit. fleet in the action off the Dogger Bank in 1781, in which three Dutch ships were destroyed and the rest compelled to retreat to harbour. Having been given command of the E. India fleet, P. sailed from Rio de Janeiro Dec. 12, 1782, but neither he nor his ship were again heard of. Nine years later its equipment was found and it was presumed to have been lost with all hands.

Parker, Sir Hyde (1739-1807), second son of above and a more famous admiral. He distinguished himself in the Amer. war, blockaded the Dutch harbours in 1782, and commanded the fleet in the E. Indies in 1795. In 1801 he was in supreme command of the fleet which was sent to the Baltic against the fleets of Russia, Sweden, and Denmark. It will be remembered that it was he whom Nelson disobeyed at the battle of Copenhagen by jocularly using his blind eye to look at the signals (see NELSON). P. compelled Sweden to remain neutral later,

and was ready to sail to Kronstadt when Paul's death put an end to the hostilities.

Parker, Joseph (1830-1902), Eng. Congregational minister, son of a stone-mason at Hexham-on-Tyne. About 1845 he became known as a local preacher and temperance lecturer. On entering the ministry in 1852, he became assistant to John Campbell at Whitefield's Tabernacle, London, soon afterwards going as pastor to Banbury, whence he went to Manchester. P. returned to London in 1869 as pastor of the Poultry church, and almost immediately began his great scheme for the erection of the building on Holborn Viaduct known as the City Temple, which was opened in May 1874. There he preached to large congregations and became famous among nonconformists for his powerful oratory. He wrote many books on religious subjects. See his *My Life and Teaching*, 1889, and *A Preacher's Life*, 1899.

Parker, Louis Napoleon (1852-1944), Eng. dramatist, composer, and pageant master, b. in Calvados, France, his father being an Amer. lawyer and his mother Eng. His great-grandfather, the Honourable Isaac P., was from 1814 to 1830 chief justice of Massachusetts. P. made rapid progress in the study of music and, at the instance of Sir Wm. Sterndale Bennett, went to Sherborne school as piano master, and stayed in Sherborne for twenty years, teaching languages as well as music. P. later went to London to teach music, but instead became a playwright, improvising his own theatre from a large barn. The list of his works is long and, generally, his plays were more successful in America than in Britain. At one time three New York theatres were crowded by *Joseph, Disraeli*, and *The Paper Chase*, while *Pomander Walk* had a record run on tour in the States. It was in *Drake*, however, produced at His Majesty's Theatre in 1912, and revived in 1914, that P. reached his highest level in spectacular grouping on the stage. Already he had achieved a great reputation outside by his pageants at Sherborne in 1905, Warwick, Bury St. Edmunds, and elsewhere in subsequent years (see on these his reminiscences, *Several of my Lives* (1928)). Besides writing his own plays he was a skilful adapter of the work of others. His *David Copperfield* gave Sir Herbert Tree a great opportunity. His *Beauty and the Barge* was very successful, and *The Man in the Street* and *The Bugle Call* were effective curtain raisers. His trans. of *L'Aiglon*, *Rosmersholm*, *Magda*, etc., were also excellent. Of his later work mention may be made of *The Cardinal*, performed at St. George's Theatre during Canterbury Week of 1930, and *The Lily of France*, a play on Joan of Arc produced at Nancy in 1936.

Parker, Matthew (1504-75), archbishop of Canterbury, b. in Norwich. In 1544 he was elected master of Corpus Christi College, Cambridge, and in 1545 vice-chancellor of the univ. in which capacity he manfully opposed the spoliation with which the colleges generally were threatened. In 1555 he was installed dean of Lincoln, but lived in retirement during

Mary's reign, to be promoted on the accession of Elizabeth to the archbishopric of Canterbury. He was a member of the great party, afterwards known as Anglican, which sought to establish a *via media* between Rom. Catholicism and Puritanism. He pub. *The Bishop's Bible* (1563-68); *De antiquitate ecclesie* (1572); and eds. of Gildas, Assor, Ælfric, the *Flores historiarum*, Matthew Paris, and other important chroniclers. He presented a valuable collection of books and MSS. to Corpus Christi. See W. T. Hook, *Lives of the Archbishops of Canterbury*, 1872; A. S. Barnes, *Bishop Parker and the Anglican Orders*, 1922; and J. O. Whitebrook, *The Consecration of Matthew Parker*, 1935.



MATTHEW PARKER

Parker, Sir Peter (1721-1811), Eng. admiral, b. in Ireland, the son of Rear-Adm. Christopher P. (d. 1765). He served in the Mediterranean in 1743, and in 1775 was in command of a squadron which attacked Charlestown, being repulsed with the loss of three frigates. He took part in the reduction of Long Is. and Rhode Is. the same year; and in 1777, having been promoted to rear-admiral, was appointed commander-in-chief at Jamaica. In 1782 he was created a baronet, and in 1799 promoted to be admiral of the fleet. He was the early patron of Nelson.

Parker, Theodore (1810-80), Amer. clergyman, b. at Lexington, Massachusetts. Educated at Harvard College, he settled as Unitarian minister at W. Roxbury in 1837. The rationalistic views which separated him from the more conservative portion of the Unitarians first attracted wide notice in consequence of an ordination sermon, in 1841, on 'The Transient and Permanent in Christianity.' He further developed his theological views in five lectures delivered in Boston, and pub. (1841) under the title *A Discourse of Matters Pertaining to Religion*, which was

followed by *Sermons on Theism, Atheism, and Popular Theology* (1853).

Parker, Sir William (1781-1866), Brit. admiral, the grandson of Sir Thomas P. (c. 1695-1784). He entered the navy in 1793, and served in the Channel fleet under Lord Howe, subsequently coming under Sir Hyde P. (1739-1807). He protected Brit. interests on the Tagus during the civil war of 1834. In 1841 he was appointed commander-in-chief in China, and having captured Amoy, Ningpo, Wusung, and Shanghai, brought the war to a successful conclusion by seizing Chin-kiang-foo. He rose to the rank of admiral in 1863.

Parkersburg, city of W. Virginia, U.S.A., and cap. of Wood co., on the Ohio, 195 m. N.E. of Cincinnati. It is a centre of an oil and natural gas region. There are iron works, chemical factories, and lumber mills. Pop. 30,100.

Parkes, Edmund Alexander (1819-76), Eng. prof. of hygiene, b. at Bloxham in Oxfordshire. He studied at Univ. College and Hospital. During 1842-45 he was assistant-surgeon in the Indian Army, and in 1849 was made prof. of clinical medicine at Univ. College Hospital. In 1855 he superintended a large civil hospital in the Dardanelles, opened to relieve the pressure upon the hospitals at Scutari during the Crimean war, and in 1860 accepted the chair of hygiene at the Army Medical School. He was the founder of the science of modern hygiene, and famous throughout Europe in the field of military hygiene. His most important work was his *Manual of Practical Hygiene* (8th ed., 1891), which has been trans. into many European languages.

Parker, Sir Harry Smith (1828-86), Eng. diplomat, b. at Birchill Hall, Bloxwich, Staffordshire. P. entered King Edward's School, but in 1841 went out to join his sisters, who had been settled some time in China. On his arrival at Macao he applied himself to the study of Chinese, which laid the foundation of his successful career. He was attaché in 1842 to Sir Henry Pottinger's punitive expedition up the Yang-tzekiang, and, though only a lad of fourteen years, P.'s knowledge of the language made him of immense service to the commissariat. In Sept. 1843 he entered the Brit. Consulate at Canton, eventually becoming head of the legation at Canton in 1856. Appointed consul at Shanghai (1861), he left there for diplomatic work in Japan in 1865. Returning to China in 1883, he took over the legation at Peking, carried through a valuable treaty with Korea, and acquired Port Hamilton for a Brit. coaling station in the N. Pacific. Worn out with overwork, he died of fever in Peking. His body was brought to England and buried at Whitchurch.

Parkes, Sir Henry (1815-96), Australian statesman, b. at Stoneleigh, Warwickshire. Possessed of very little education, he worked for some time as a labourer, but emigrated to Sydney in 1839, where he found more congenial employment. During his spare time he developed a taste for literature, publishing a small vol. of poems, *Stolen Moments*, in 1812. He

became interested in politics, and in 1849 started the *Empire* newspaper, in which he expressed his views against the transportation of convicts. For some years he represented E. Sydney in the Legislative Assembly. P. came to England in 1861 as a commissioner for promoting emigration. On his return he was made colonial secretary in 1863, and when the Martin ministry resigned, in 1872, became Prime Minister, to which office he was five times re-elected. His financial position was never strong, and he died, a very poor man, at Sydney. P. was instrumental in passing the Public School Acts of 1866, and worked hard in the cause of Australian federation. See life by T. Bavin, 1941.

Parkes, to. in Ashburnham co., New S. Wales, Australia, 300 m. W.N.W. of Sydney. There is gold-mining, and fruit and wheat growing. Pop. 8000.

Parkhurst, dist. wholly contained within the area of the bor. of Newport. It is a growing residential dist. and includes the Albany Barracks (depot of many well-known regiments), P. Prison (the famous penal institution), the Camp Hill Borstal Institution, St. Mary's Hospital, and the administrative headquarters of the Isle of Wight Hospital Group.

Parkman, Francis (1823-93), Amer. historian, b. at Boston in Massachusetts. He was called to the Bar, but he never practised, and devoted himself to the writing of historical works, as a rule taking for his subject the war between England and France in Canada. He was unremitting in his labours, and made careful study of documents and places at first hand, making, amongst others, the famous journey along the Oregon Trail. His books are standard authorities on the hist. of colonial N. America. His prin. works are *The Conspiracy of Pontiac* (1851); *The Pioneer of France in the New World* (1865); *The Jesuits in North America* (1867); and *Montcalm and Wolfe* (1884). See M. Wade, *Francis Parkman: Heroic Historian*, 1912, and (ed.) *The Journals of Francis Parkman*, 1949.

Parlement. The Ps. of Fr. hist. were those important tribunes which prior to 1789 were invested with sovereign judicial authority, together with such political and magisterial powers as early rendered them formidable instruments of monarchical tyranny. Historians were long in conflict as to their origin. Some ascribe the Ps. to the great military assemblies called 'champs de Mars,' in which were discussed, during the earliest period of the Fr. monarchy, national affairs generally. Larousse repudiates this suggestion, and most modern Fr. historians concur in drawing a broad distinction between the origin of the P. and that of the *États Généraux*, and deny any analogy between the Fr. P. and the Eng. Parliament on the ground that, while the latter has always had a peculiarly political character, the former always had a peculiarly judicial character. According to Loryseau and Machiavelli, the institution of the Ps. was the vital factor in saving feudal France from such dismemberment as occurred in Italy and Germany, for most

of the Fr. kings developed the powers of these bodies as a weapon against feudality, and gave them, as far as possible, an independent status. This supreme power was soon turned against the monarchy, and Thierry mentions that in the reign of Louis XII. the P. acted as a sort of mediator between the king and the nation. Under Louis XIII. the pretensions of the P. increased, especially after the dissolution of the États Généraux of 1615. It took upon itself to censure the policy of the queen, extravagance of all kinds, and the shackles put upon justice by the court and the nobility. In the ensuing struggle between the P. and the monarchy, the former was completely humiliated by the boldness of Cardinal Richelieu. On the death of Louis XIV. the P. became once more as powerful as before, tore up the will of the late monarch as it had that of his predecessor, and formally took upon itself the name of 'sovereign court. Constitutionally it appears during the early years of the eighteenth century to have admitted that 'the legislative power belonged to the king,' but claimed to 'verify the royal edicts,' to see that they contained nothing contrary to the fundamental laws of the kingdom. In 1762 the P. acquired tremendous popularity by declaring the abolition of the society of Jesuits, and in despoiling that society of its property. Finally in 1792 the P. was definitively abolished on the ground that the nation had never concurred in the election of its members. From one point of view it is possible to regard the birth of liberty in France as synchronous with the abolition of the P., but every Fr. historian and publicist from Laboulaye downwards acknowledges both the services those tribunals did for France and the splendid types of characters they formed from time to time.

Farley, Peter, see GOODRICH, SAMUEL GRISWOLD.

Parliament. HISTORICAL SKETCH.—Down to the revolution of 1688 the hist. of the Eng. P. is, in a sense, that of the struggles between the king, the nobility, and the people. After that date it becomes the hist. of the struggle for electoral reform and of the evolution of the doctrine of ministerial responsibility, together with the development of the party system. The landmarks of the pre-revolutionary period are the resistance of the king and the people, in alliance, to the tyranny of the feudal barons, and, later, the alliance of the barons and people against the encroachments of the royal prerogative; the admission to P. of the medieval burghesses ostensibly to be consulted on questions of taxation (the beginning of the development of popular representation); the alternating concentration of power, first in the hands of the monarchs and then in the commons, between the end of the thirteenth century and the close of the Tudor period; the struggle, during the Stuart period, between the protagonists of the divine right of kings on the one hand and the supporters of parl. privilege and lawful taxation on the other, compli-

cated by questions of religion; and the limitations of the royal prerogative as embodied in the Bill of Rights. A brief narrative of these phases will now be attempted before dealing shortly with that period which saw the triumph of the democratic idea in the Reform Act of 1832.

According to Stubbs, the term P. was first used in England by Matthew Paris (q.v.) in 1246, and probably introduced through the Normans or through intercourse with the Fr. kingdom (*Constitutional History of England*). It is also used retrospectively by later writers, and Stubbs mentions the fact that in a record of the twenty-eighth year of Henry III. the assembly in which Magna Carta was signed is mentioned as the 'Parlamentum Runnmede.' It is clear that no very precise meaning can be given to the term by reference to the class of persons that at any particular time constituted the national assembly, though many historians seem to differentiate the deliberative assemblies of the Plantagenet monarchs at and after the time of Simon de Montfort's celebrated P., by calling them 'Ps.' as opposed to the 'Magnum Concilium' of the anterior period. One thing emerges clearly from a survey of Eng. institutions, and that is that there has always been, in spite of the pitch of despotic power to which some Eng. monarchs have attained, a national assembly, a fact which distinguishes the hist. of England from that of every other European kingdom. For the Witanagemot becomes metamorphosed into the Great Council, and the latter into the bicameral P. of a later date. But the A.-S. folk-moot, though a popular assembly which declared the law or custom of the countryside, was a localised institution, and as such did not deliberate such great matters as war and peace; nor can the Witenagemot be taken as a really convenient starting-point for a historical sketch, because the balance of opinion seems to be that it was an aristocratic assemblage in the constitutional powers of which the people at large did not participate (see on this point the contrary opinion of E. A. Freeman, *History of the Norman Conquest of England*, 1887-1879, and J. M. Kemble, *The Saxons in England*, 1849). It is probable that the people had some shadow of theoretical right to attend, e.g. when a new king was to be elected, but there is no evidence that they habitually did so; and we may, therefore, regard the Witanagemot or the later Magnum Concilium, or Council of Magnates, as the forerunner of the House of Lords, and perhaps the assembly at Runnymede as the lineal progenitor of the House of Commons, though until the year 1295 there appears, in spite of the frequent summonses of the burghesses to attend, to have been for the most part but one legislative chamber. There can be little doubt that the struggle between the king and the greater feudal barons was the predisposing cause of popular liberties; for the kings, at a time when William the Conqueror's notions of the appropriate relations between the

kingship and the feudal hierarchy of tenants were as yet in the balance, generally found themselves forced to secure the support of the people at large, with the result that some idea of popular liberties slowly emerged, albeit largely in the interest of the land-owning class. The judicial, fiscal, and legislative reforms of Henry II. (as to the fiscal, especially the commutation of knight service for scutage, which made the king independent of the baronage in respect of his fighting force) sealed the doom, not only of the barons, but also of any future monarch who should disregard the type of Eng. government and administration crystallised in those reforms. Thereafter the opposing forces were usually the king and his foreign favourites on the one hand, and on the other those barons who, excluded from power and privilege, sought to acquire both by winning control over the Crown. The Commons were from time to time drawn into alliance with baronial factions, but attempts to introduce continuous control of the Crown broke down in face of the barons' reluctance to undertake such an onerous task. Finance and judicial business were the chief concerns of the representatives, and the king's court estab. a superiority in these matters over local feudal courts. It is essential to bear in mind that P. was (and is) the 'high court.' 'No taxation without representation' has been the peculiar genius of Eng. government at almost all times, and Englishmen were familiar with the idea of representation long before the reign of John; for prior to that time the king's officers (generally circuit judges) used to arrange financial matters with the commoners' representatives in the shape of the recognitors of the grand assize (the progenitors of the modern co. member) and deputies sent by the bor. inhab. (the forerunners of the modern burgess). See **BURGESS**; **ELECTORATE**; **JURY**; **REPRESENTATION**.

The representative principle became further developed in the reigns of John and Henry III., when co. and bor. representatives were occasionally summoned to meet either the king or the barons at some selected tn. to confer about taxation; which conventions very naturally prompted a desire for a national P., though it was not till the reign of Edward I. that a P. was summoned which consisted of representatives of all the estates of the realm (*q.v.*), viz. archbishops, bishops, superior clergy, barons, knights of the shires, and burgesses. Prior to De Montfort's famous P. of 1265 there were only four instances of co. representatives being summoned to the national council, the first being in 1213, the second 1254, the third in 1258 (the 'Mad Parliament'), and the fourth later in 1258. In all these cases the prin. if not the only business was the discussion of financial matters. Strictly the wording of Magna Carta gave the king no option but to consult the people's representatives on the question of taxation; and inasmuch as there already existed a recognised machinery in the shire-moots for the

election of knights to nominate recognitors in civil suits, or, in other words, a working system of co. representation generally, the Crown had still less justification for abstaining from summoning at least the knights of the shires. The burgesses or tn. representatives, however, were shut out until the bold innovation effected by Simon de Montfort, earl of Leicester, who, in spite of the various conflicting opinions as to the novelty of his democratic work, may not unjustly be termed in Pauli's words, 'the creator of the House of Commons.' The writs which De Montfort caused to be issued in 1264 required the sheriffs to return not only two knights from each shire, but also two citizens from each city and two burgesses from each bor. It is tolerably certain that Henry III., though he called the burgesses to the national assembly, had no desire to consult them on matters of state; and indeed Edward I. would appear to have favoured the idea merely because it was an easier mode of raising money than by a purely arbitrary method. But though they were long ignored in the matter of legislation and deliberation generally, the very fact that they were regularly summoned inevitably led to their gradually acquiring a degree of political status. Moreover there were social causes at work which may find analogous expression even at the present day. For whereas at first knights and burgesses deliberated and voted apart, the former soon forgot the fact that the representatives of the thriving and wealthy cities and tns. were socially their inferiors, and began to join with them in presenting petitions for legislation. This alliance was rendered the easier by the fact that younger sons of noble families, being excluded from rank by the heirs, were plain esquires. Finally the knights broke away altogether from the greater barons or hereditary legislators, and sought the House of Commons as their appropriate sphere. By the reign of Edward III. the Commons had become much bolder, and not only successfully asserted a right to veto enactments affecting the people at large, but declared to the king in P. that they 'refused to be bound by any of his statutes or ordinances unless made with their assent.' The Crown interested itself in the composition of the Commons (see **ELECTORATE**).

Since Magna Carta no king could question the right of the co. to send their representatives to P.; but the Crown did not hesitate to dispute the bor. representation, and in consequence sev. Acts were passed to check the Crown's attempts in this direction; which attempts generally took the form of incorrect returns of members by the Crown's nominees, the sheriffs. In Richard II.'s reign an Act was passed fining sheriffs who made false returns, and in the time of Henry IV. the justices were empowered by statute to inquire into the same abuses. After the House of Commons was estab. as a separate legislative body, it began itself to restrict the suffrage (see **ELECTORATE**), e.g. an Act was passed in 1430 to restrict

the co. franchise, formerly possessed by all freeholders, to those whose freeholds were worth forty shillings a year (i.e. £20 in present-day money). Towards the close of the Middle Ages, parl. importance suffered a marked decline, more and more of the general petitions which were a chief function being referred to the executive branch of the gov. This process, analogous to the decline of Ps. in France, Spain, and Germany, was halted only when the Tudors recognised the importance of attaching mass opinion to the benevolent dictatorship which they estab. Under the Tudors P. is at first entirely subject to the king; it is rarely summoned by Henry VII., or during the first part of the reign of Henry VIII. It was not until the latter years of Elizabeth's reign that the Crown lost its ascendancy and initiative. The dangers of civil war lingering on from the Lancastrian-Yorkist factions, and the need for a strong gov. to stamp out the remnants of baronial lawlessness, enabled Henry VII. to maintain with ease the ultimate power of the Crown. To him P. was useful, but it was by no means necessary. Yet its usefulness in canalising popular support gave it some importance, and an effective resistance was later made to Thomas Cromwell's attempts to introduce a standing army and other means of unlimited royal autocracy. In Henry VIII.'s reign P. was establishing a continuity important for the future. The breach with Rome was effected through P. and with parl. approval, since a façade of popular action was thus built up. Yet the very fact that Henry used and consulted P. gave the institution an ever-increasing importance. The Sp. menace, and the fear of Rom. Catholicism, demanded a strong central authority, but after the defeat of the Armada new spirit began to manifest itself, and Elizabeth's latter years were marked by an ever-growing independence of speech and action by P., complicated by the conflict between Puritanism and the Anglican Church. Repeatedly Elizabeth declared that there were topics—such as her marriage, religion, and foreign affairs—which were not to be considered matter for parl. concern, and repeatedly the more progressive elements denied this restriction. The Commons indeed came into collision with Elizabeth on sev. occasions, e.g. on the question of the queen's marriage and the settlement of the succession 1566; on eccles. matters, 1571, and 1593; and on monopolies, 1601. The control which the council had exercised over parl. deliberations began to give way to a new group of Commons leaders. With James I. and Charles I. this process developed with growing speed to the inevitable outcome in civil war. With all the Englishman's Concern for precedent and legality, Crown and Commons appealed to the past. The lawyers became leaders in P., since they could produce justifications for parl. claims which were practically effective if theoretically doubtful; they could draft bills and organise business; and they were supported by the legal knowledge

which almost every Stuart gentleman acquired as part of his education. Sir Edward Coke represents this importance of the lawyers, both in P. and outside, where in his judicial capacity he developed and consolidated the common law against the autocratic claims of his sovereign. The Stuarts took their stand on theory; they claimed a theoretical divine right of kingship which was no less irritating because the Tudors had enjoyed it in practice. The need for authoritarian government had passed, and the politically conscious middle classes were demanding that this be recognised. That the Crown also supported the estab. church added a further source of conflict with those of the commons who had embraced the Puritan beliefs. Once the claim of taxation without parl. approval had been advanced, and material interest reinforced religious and political ideas, compromise became impossible.

During the Interregnum a period in which P. undertook executive authority was followed by one in which it lost all authority to Cromwell, whose rule convinced the nation, with a clarity which seems to be now an inherited characteristic, that irresponsible government was not to be borne. The folly of James II. reinforced the lesson, and the peaceful revolution of 1688 marked the beginning of theoretical and practical parl. dominance over the Crown, and of the responsibility of the executive to P.

The clause in Magna Carta against the imposition of arbitrary aids, after the span of close on five centuries, found renewed expression in the wording of the Bill of Rights, making illegal the levying of money for the use of the Crown by pretence of prerogative, without leave of P. The Bill of Rights gave the death-blow to prerogative for all time, and made it true in fact as well as in theory that the king was a monarch with powers limited by those of P. Henceforth the hist. of P. is that of party government: the wielding of the prerogative power by the party in the majority in the House of Commons, or rather by the Cabinet (see on this CROWN; CABINET; PARTY GOVERNMENT). The Crown was reduced to the exercise of personal influence, and even that suffered an irretrievable blow from the alien manners and speech of the first two Georges. But that the victory over prerogative achieved by the revolution of 1688 was a far cry from the ideals of a democratic P. is sufficiently attested by the tremendous struggle for electoral reform and the disfranchisement of the 'rotten bors.' that culminated in the Reform Act of 1832. Whether the hist. of P. subsequent to that date shows a real advance in the democratic principle as conceived by the idea of popular representation is a question which must to a large extent depend upon the view the individual may take of the functions of a private member of the House of Commons, or, in other words, how far it is really for the benefit of the community that the private member should subordinate himself entirely to the rule of the

ministry; and the ascendancy of the Cabinet is as marked to-day as ever. It is not, however, proposed to pursue the sketch of this period of parl. hist. further in this article, as the whole question has been treated both historically and critically in the articles on PARTY GOVERNMENT, CABINET, ELECTORATE, and POLITICS. The hist. of the House of Lords has not been specially adverted to in the above sketch because it is to a great extent that of the Privy Council (*q.v.*), or rather of the Great Council of the Saxon and Norman kings out of which sprang the Privy Council, the Cabinet, the executive depts. of state, and the high court (*see* CABINET;

hereditary right to the privileges of the peerage.) The House of Lords has undergone no essential change in its composition ever since that composition was stereotyped in the Middle Ages, though occasionally life peers sat in the House. Since the decision of the Committee of Privileges in the Wensleydale case (1856) no life peer, except spiritual peers and the lords of appeal in ordinary, has ever been allowed to take a seat in the House of Lords. The more recent hist. of the House of Lords will be found in the article PARLIAMENT ACT, 1911.

MODERN TRENDS.—The Imperial P. no longer legislates for the dominions or the



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PARLIAMENT

Moving the address to the Crown at the meeting of the first reformed Parliament, 1833

PRIVY COUNCIL; GOVERNMENT). It is important, however, to notice that before Magna Carta a distinction had grown up between the *maiores* and *minores barones*, and that by Article 14 of the charter the former were to receive a special writ and the latter a general writ, calling them to P. In fact the greater barons were those who in their military, fiscal, and legal transactions dealt directly with the king, while the lesser transacted their business with the sheriff. If Simon de Montfort can be said to be the creator of the House of Commons, there is equal justification for Stubbs's dictum that Edward I. created the House of Lords; because even after 1215 the greater barons were by no means a strictly defined class, and it was merely by reason of Edward I.'s consistent exercise of his power to select those whom he chose to be summoned by special writ that the demarcation of the hereditary legislator from those titled persons who were not to be so highly honoured resulted. (*See also* NOBILITY on the principle of the

greater part of the empire, and it ceased to do so long before the Statute of Westminster (*q.v.*). Nor does it now venture to pass bills of attainder or confiscate property or deprive people of life and liberty without due process of law, excepting in very rare cases. Yet theoretically it can do all these things, for there is no legal limit to what P. can enact. By contrast with the Amer. political system of checks and balances, the Eng. is designed, not unsuccessfully, to make it easy to determine what general line of policy shall be followed, and by what individuals it shall be carried out. In America it seems that the people authorise the president to follow some clear-cut policy, while at the same time they give authority to Congress to act differently, and to the supreme court to prevent either president or Congress from acting unconstitutionally. But democracy in England, which reduces the influence of personalities to the few leaders on either side, means the choice of a gov. with almost plenary

powers. Hence it is that 'third' or independent parties fade out of the Eng. parl. scene, because the Eng. voter is averse from throwing away his vote on lost causes. It is no doubt true that among the principles for which Wilkes successfully fought was the right of the electors to choose what candidates they liked for P. Actually, to-day, the average constituency has no choice in the matter, the candidates being nominated by the party machines; while, as regards the Conservative party, none but wealthy candidates have any hope of nomination. In the eyes of an Amer. critic a parl. system whereby complete power is put into the hands of a small group of men, whose exercise of their authority is restrained only by public opinion and tradition, which, however, are strong sanctions in England, seems undemocratic. For in the Amer. political system power is deliberately divided, little or no trust being reposed in the discretion of either the executive or the legislative power, while minorities have ample legal powers to impede the action of majorities. 'Under all the feudal trappings and elaborate procedure lies the simple assumption that the majority of Parliament represents the majority of the people and, as the people cannot exercise direct power, no more can Parliament, so that the decision what laws are made, altered and repealed, as well as the practical business of administration, is the business of the Cabinet so long as the House of Commons supports it. And the House of Commons is organised on a party basis to secure that such support will be given. It is only in the rarest circumstances that a House of Commons elected to support a government overthrows it' (D. Brogan, *The English People*). Thus it will be appreciated that P. is a more important institution in the Eng. system than Congress is in the Amer. political system, because it does not share its powers with a president or a court over which it has no direct control; yet, by a seeming paradox, members of P. as a class are less important than congressmen, because they, in effect, delegate most of their powers to the ministry. This is not, however, undemocratic, for the Eng. voter at an election is primarily choosing a Prime Minister, so that really the House of Commons is, as it were, a kind of electoral college and national convention combined. But the good party man or unambitious, silent member, who never puts awkward questions to the gov., is not necessarily the best man from the country's point of view or from that of P. as an institution. The restless critical self-advertising type of member is much more likely to keep P. before the press and public as a dynamic institution than a house of party hacks, however able may be the gov. of the day. 'Every instance of a safe Labour seat given for irrelevant services rendered, every case of a Conservative seat sold, every disillusionment of the young and hopeful politician, tells against the efficiency of the basic English political institution, Cabinet Government' (Brogan).

POWER AND JURISDICTION.—The 'transcendent and absolute' power of P. for making laws was asserted by Coke, and Blackstone and Dicey use language to the same effect. It is needless to say that the old Amer. colonies, which by winning their independence destroyed the first Brit. empire, did not accept this dictum. But it was enshrined in a Declaratory Act of 1764, which remains on the Statute Book to-day, albeit subject to the limiting effect of section 4 of the Statute of Westminster, 1931 (*q.v.*) (which provides that no Act of P. shall extend to a dominion unless that dominion has requested and consented to its enactment). It may be noted, however, that most authorities accept the interpretation that the imperial P. could, as a matter of abstract law, repeal or disregard that section. The point, however, is purely academic, for no imperial P. would venture to violate the Statute of Westminster, the provisions of which are in themselves only declaratory of long estab. usage. Dr. Ivor Jennings points out that in emphasising the 'transcendent and absolute' authority of P. there is a tendency to overlook the legislative functions of both Houses; for legislation is not the sole, or even the more important, function of the House of Lords, which is an assembly for debate of the less technical and less purely 'political' issues of government; and though the House of Commons carries out the essential business of legislation, often under the greatest pressure of time and urgency, its time is by no means wholly occupied with legislation. It is probably true to say that, omitting financial business, only about two-fifths of the time of the House is occupied in considering Bills. General policy debates occupy much of its time, and much of the discussion on legislative proposals is not of a legislative character. It is the responsibility of the gov. as much to initiate legislation as to conduct administration, and all important Bills, and indeed most others, are produced by the gov. In substance, therefore, P. controls legislation, as it does administration, by debating and ultimately approving the policy of the gov. But even so the element of control is slight, and if the House as a whole is hostile to the gov. it can compel the gov. either to resign or to dissolve P. Naturally this is most unlikely where the gov. possesses a party majority and, normally, the gov. has at its command a stable parl. majority, 'whose support is based on loyalty to the personnel and acceptance of the principles of the party from which the government is drawn, upon dislike of the alternative which would be drawn from the opposition, and upon the threat of dissolution which the government can if need be wield' (Jennings); and though in one sense it may be true that the House controls the gov., in a more practical sense the gov. controls the House. When the gov. has a majority in both Houses, the 'transcendent and absolute' authority of P. is the authority of the gov. But it is not really transcendent and absolute, for behind both gov. and the House of Commons

is public opinion, which, vague though it may sometimes be, can quickly transform the whole parl. scene in times of emergency, as, for example, when in 1840 Neville Chamberlain's Gov. collapsed, and gave way to the Coalition Gov. of Winston Churchill.

While P. can, within the limits of public opinion, decide anything, this does not imply that any member of the Commons can bring forward any motion at any time he thinks fit, for the activity of private members in respect of such functions as asking questions, moving the adjournment of the House, introducing Bills, or moving amendments, is very rigidly limited. The importance of the absolute legal authority of P. is that, there being no constitutional limitation on legislation, there is no topic which the House cannot discuss, though not all matters can be discussed with equal facility, e.g. under a rule over two centuries old, if a Bill involves expenditure it can proceed beyond its second reading only if a minister introduces a financial resolution. In short, the 'transcendent and absolute' power of P. places enormous power in the hands of the gov., but it is not a power which can be seriously abused, for abuse would lead to retribution at the hands of the House of Commons or the electorate. Because it is a democratic system the Brit. parl. system can afford strong gov., and does not require constitutional limitations upon parl. authority (see W. Ivor Jennings, *Parliament*, 1939).

PRESENT RELATIONS OF THE CROWN AND PARLIAMENT.—By virtue of the prerogative the Crown is entitled to summon, prorogue (see PROROGATION), and dissolve P. On the accession of a new sovereign P. must assemble without delay (see DEMISE). The king is not supposed to pay official visits to P. except on stated solemn occasions, viz. at the opening and closing of a parl. session. He can, but does not, personally attend to assent to Bills that have passed the Houses. The formal ceremonial of the speech from the throne at the opening of a session, in so far as it has any real meaning, is intended to indicate the nature of the state's relations with other countries, and generally to outline the gov. programme of legislation. To drag the name of the sovereign into debate in order to influence the opinion of either House is contrary to parl. etiquette, and no member is allowed to speak slightly of the sovereign. The king may dissolve P. when he chooses, but it need hardly be said that his discretion has become the constitutional privilege of the Cabinet (see CABINET). The mode of dissolution is by proclamation (*q.v.*), issued technically by the advice of the Privy Council (*q.v.*). Either House may adjourn for any period it likes; and until 1906 the practice was to adjourn for the greater part of the autumn. The Crown has a statutory power to order a resumption of business when both Houses stand adjourned for more than six days. That P. must sit at least once a year is guaranteed by the fact that no demand for taxes would be legal unless

it did (see on this Dacey's *Law of the Constitution*).

HOUSE OF LORDS: Composition, Officers, and Privileges.—The upper House is composed of temporal hereditary peers of the United Kingdom, spiritual Eng. peers, Scottish elected peers, Irish peers elected for life, and lords of appeal in ordinary who are appointed for life and sit and vote as barons; all these classes together forming two estates of the realm, the lords spiritual and temporal. At present there are 4 peers of the royal blood, 2 archbishops, 20 dukes, 28 marquesses, 116 earls, 80 viscounts, 7 lords of appeal in ordinary including the lord chancellor, 24 bishops (of whom those of London, Durham, and Winchester always sit, and 21 others are appointed as vacancies occur in order of seniority by consecration), 478 barons, 16 Scottish representative peers, and 13 Irish representative peers. Of lords of P. some hold their seats during tenure of office only, others for life, while the remainder are hereditary peers. A bishop loses his seat on retirement, but a lord of appeal holds his seat for life. The Scottish representative peers are co-opted by all the Scottish peers assembled at Holyrood whenever an election is directed by royal proclamation.

The prin. officers of the House of Lords are (1) The Speaker, who, though usually the lord chancellor, may be a commoner, called the lord keeper. But the Speaker of the House of Lords has not the wide powers of his brother in the lower House; questions of order are determined not by him, but by the House, and in debate the House, and not the Speaker, is addressed. (2) The Chairman of Committees, who holds office during the lifetime of a P. He takes the chair when the House goes into committee, and superintends all matters appertaining to private Bills. In the absence of the lord chancellor he may be authorised to act as Speaker. (3) Gentleman Usher of the Black Rod, who is appointed by letters patent under the great seal, and is a member of the royal household. His duties, which are purely ceremonial, are to assist at the introduction of peers, to desire the attendance of the Commons when necessary, and to execute warrants of commitment. His appellation is derived from the black wand, surmounted by a golden lion, which is used as the mace of the House of Lords. (4) The Serjeant-at-Arms, who carries the mace when the lord chancellor enters and leaves the House. (5) The Clerk of P., who keeps the journals of the House, makes minutes of proceedings, acts as registrar of the House sitting in its judicial capacity, and signifies the royal assent to Bills that have passed both Houses.

The chief privileges of the upper House are as follows: (1) Freedom of speech (but the case of Lord Abingdon establishes the principle that a peer cannot afterwards publish a speech delivered by him in the House so as to make it a vehicle of slander against any one). (2) Freedom from arrest or molestation, which privilege used to, but does not now, extend to the servants of peers. The privilege, which is

limited to civil causes, and in no way fetters the administration of criminal justice, commences forty days before a session and terminates forty days after the session. After a dissolution it is enjoyed for a reasonable and convenient time for returning home. (3) The right to demand audience of the sovereign in order to tender him advice as an hereditary counsellor of the Crown. (4) The right to record a written protest in the journals of the House against a measure disapproved of. (5) The right to decline to attend in court as a witness on subpoena; but this privilege has generally been waived. (6) Exemption from jury service. (7) Right to vote by proxy; a right which has been waived since 1868. (8) The right of the House to commit a member or other person for breach of privilege and for contempt for a definite period. If no

House of Commons stood at 640, but the nominal membership had stood at 658 ever since the Act of Union with Ireland. The Redistribution Act of 1885, by increasing the number of members for Scotland from sixty to seventy-two, brought the nominal total to 670. By the Representation of the People Act, 1918, the number was increased to 707, but the reduction of the number for N. Irish constituencies from 52 to 13 under the Gov. of Ireland Act, 1920, and the cessation of representation for S. Ireland reduced the total number of members of the House of Commons to 615.

By the Representation of the People Act (1915) twenty-five new constituencies were created, making the total of 640, but by the Representation of the People Act (1948) the total membership was lowered to 625, the distribution being as follows:

	England	Wales	Scotland	N. Ireland
Counties	215	26	39	8
Boroughs	291	10	32	4
Total	506	36	71	12

period is fixed the person committed is released on a prorogation or dissolution. (9) The right to try impeachments by the Commons, not only for high crimes and misdemeanours beyond the reach of the municipal law of the state, but for any crime whatever. It is hardly necessary to say that the privilege is obsolescent by reason of the fact that P. has in these days acquired such complete control over the royal prerogative that the Crown is no longer able of its own motion to protect political offenders from justice. (10) The right of the House to try peers and peeresses for treason or felony, and, conversely, the right of the individual peer to be so tried. This right rests on the literal meaning of *parum suorum* in Magna Carta, and has, illogically, become restricted to the barons of P., and then only in cases of felony. Only twice in this century has the House of Lords met in its ancient capacity as a criminal tribunal of first instance, once in 1901, and then not until 1935, when Lord de Clifford was indicted for manslaughter (a motoring case), and acquitted. (11) The right of the House to try disputed peerage claims. Only lay peers may take part in such trials. (12) The right to act as the final court of appeal from all the superior courts of law in Great Britain (see PRIVY COUNCIL). Some members of the gov. must be in the House of Lords, and the conduct of business there must be in the hands of ministers. The effect of the Ministers of the Crown Act, 1937, is that at least three ministerial heads of depts., and at least three other ministers, must sit in the House of Lords.

HOUSE OF COMMONS: Composition, Officers and Privileges.—(As to the qualifications for membership, mode of election, and parl. registration, see ELECTIONS). Up to 1885 the actual membership of the

Members of the House of Commons receive ann. salaries of £1000 and travelling facilities over the railways to and from their constituencies. Payment of members was introduced in 1911 by vote on the estimates, and this vote is now a permanent feature of the ann. Appropriation Bill. Thus the cost does not fall on the constituencies, which formerly it did in the days when the hors. used to pay their members. It has been judicially decided that payment does not depend on attendance at the House.

The prin. officers of the House of Commons are: (1) The Speaker, who receives a salary of £5000 a year, is the first commoner in the country, and generally retires with a peerage on a pension of £4000 a year. He is elected by the House at every new P., but the Speaker of the old P. is customarily re-elected provided he has not lost his seat. The Crown has the right to reject the person elected, but never avails itself of this privilege. The Speaker is in an exalted position, and although he never votes save on an equality (see CHAIRMAN), and rarely takes part in debate (except very occasionally in a committee of the whole House), his powers are substantial, especially in respect of rulings as to procedure. The Speaker acts independently of all party considerations, whence it is quite immaterial from which party he may be chosen. His other functions are to maintain order, sign warrants of commitment for contempt, reprimand members when necessary, and sign warrants for by-election writs. The impartiality of the Speaker is of little more than a century's standing. In the days of liability to impeachment, ministers in the plenitude of their power were far from solicitous of their opponents' rights, and, so long as the House

was dominated by bribery and corruption, the conventional rules implicit in a democratic system could not be developed. (2) The Chairman of Ways and Means, a member of the House who has a salary of £2500 a year, takes the chair when the House goes into committee, maintains order in committee, and acts as Deputy Speaker of the House in the unavoidable absence of the Speaker. He is nominated by the gov. and, like the Speaker, holds office until a dissolution. When acting in committee he can apply the closure (*see* CLOSURE). He also has important duties in conjunction with the chairman of committees of the upper House in regard to private Bills. In his absence the Deputy Chairman, also a salaried officer at £1500 a year, acts for him. (3) The Serjeant-at-Arms, who bears the mace when the Speaker enters or leaves the House. He is appointed by letters patent at a salary of £1700, and his prin. duty is to execute the directions of the Speaker relative to the maintenance of order. Hence he has power to arrest strangers who have no lawful business in the House, execute warrants for contempt, and bring persons in custody before the Bar of the House. (4) Clerk of the House of Commons. This officer is also appointed by letters patent and receives a salary of £3500 a year. His prin. functions are to make entries of all that transpires in the House, and from such entries to prepare the hours, or records of the proceedings in the House, and to endorse Bills sent up to the Lords. (5) Whips. There are gov. and opposition Whips. The duties of the recognised whips, which are harassing and often thankless, are to see that their party is duly represented at a div. Hence they must personally know their fellow members in the House by sight, so that when a div. comes on they are in a position to ensure a full vote. They are supposed to keep the party leaders fully informed about the members generally, and also to act as intermediaries between the leaders and the various local party organisations. In more important debates the order of the chief speakers on each side is arranged between the whips and given to the Speaker, who usually adheres to it. The whip is essentially the creation of the party system (*see* PARTY GOVERNMENT). The gov. whip must be ever on the alert to prevent the possibility of a snap vote. If he makes an error in calculating the numbers of his 'flock' that have strayed, or in estimating the probable duration of a debate, he may find himself in an awkward dilemma (but as a rule he can get some members of the gov. to talk against time until he can round up the followers). The gov. whips are, technically, junior ministers. The chief whip is parl. secretary to the treasury. Until recently he was known as 'patronage secretary,' a name which comes from the days when a majority was kept by patronage or influence; and his functions in this respect have not entirely disappeared, for he brings to the attention of the Prime Minister the names

of members who merit honours and whose support will be more effective if honour is accorded them. (6) There are also a number of minor officers such as prin. clerks, assistant and senior clerks, examiners of petitions for private Bills, the editor of the official debates, chaplain, and others.

The privileges of the House may be divided into two classes according as they are or are not claimed by the Speaker at the opening of a new P. But all privileges are of equal validity whether so claimed or not, for all alike rest upon binding legal decisions or statute law. The chief privileges claimed by the Speaker are: (1) Freedom of speech. This important privilege is essential to every free council or legislature, but it was only after a series of historic battles, in which the most prominent names were those of Haxey, Yonge, Strode, Elliot, Hollis, Valentine, and Conway, that the privilege was finally vindicated. This privilege is also to be construed by the light of Creevy's case, Watson's case, Wright's case, and the Act of 1810, so as to give summary protection to persons engaged in the pub. of parl. papers (passed in consequence of the celebrated case of *Stockdale v. Hansard*). The principles deducible from the cases are that a private member is not entitled to claim the privilege when he sends to an editor a correct report of a speech made by him in the House and containing a charge against an individual; but that a fair and faithful report not only of such a speech but of the whole debate is not actionable (whence presumably it would be a breach of the privilege to 'tack the publisher'). By the Act of 1840 proceedings, criminal or civil, against persons for the pub. of papers printed by order of either House of P. will be immediately stayed on the production of a certificate, verified by affidavit, to the effect that such pub. is by order of either House of P. Formerly the House itself looked with no favourable eye on the pub. of its debates, because the Crown thereby became cognisant of what passed within the walls of the House (*see also under* NEWSPAPERS as to the hist. of newspaper reporters in the Gallery). It is to be noted that there are limits to the freedom of debate, which are imposed by the House itself; for any member is liable to censure and punishment by the House if he utters offensive words in P. Such punishment may be a mere admonition, or the offender may be suspended, expelled, or even imprisoned. (2) Freedom from arrest. This privilege is co-extensive with that of the House of Lords. Similarly, when a member of the House of Commons commits a crime, he has no immunity, but is arrested like any other subject, and, if convicted, the judge notifies the Speaker. The papers are then laid before the House at their request, and the question of expulsion is considered. (3) Right of access to the Crown through the Speaker; which right is exercised only when an address is presented to the king by the whole House. Addresses may also be communicated to the sovereign by

any members who have access to him as privy councillors or as members of the royal household. (4) Right of the Commons to transact whatever business they choose without reference to the wishes either of the Crown or its ministers. This very ancient privilege is affirmed at every opening of P. by the formal first reading of a dummy Bill before the king's speech is delivered, a symbolical ceremony which is as meaningless in practice as the privilege, for under the present Standing Orders practically the whole time of the House is at the absolute disposal of the gov.

The privileges not claimed by the Speaker are: (1) The right of the House to regulate its own constitution, as a corollary of which the House is theoretically entitled to settle disputed elections and to pronounce on the legality or otherwise of an election. The House, however, long since transferred to the law courts the right to deal with petitions against the validity of an election (see ELECTIONS). By virtue of this privilege the House can also of its own motion expel and refuse to admit persons, even though elected as members, whom they regard as unworthy of their assembly. (2) The right to control finance, and initiate financial legislation (see especially PARLIAMENT ACT, 1911). (3) The right of impeachment. (But see the earlier part of this article and IMPEACHMENT). (4) The right (according to Sir Erskine May, not a right or privilege at all, but merely an expectation that the Crown will exhibit its habitual courtesy in the matter) to have the most favourable interpretation put by the Crown on deliberations of the House. (5) The right to punish both members and strangers for contempt. A person committed by the House is usually given an opportunity of apologising. If not set free at the end of a session, he can demand a writ of *habeas corpus*. (6) The right to decide, uncontrolled by the law courts, all matters arising within the precincts of the House. Mr. Justice Stephen in the case of *Bradlaugh v. Gossett* (in which the celebrated atheist after being prevented by the Serjeant-at-Arms from entering the House, sued for a declaration that the order of the House was invalid) stated *obiter* that in his opinion there was a limit to the privilege, and that the House could not, although technically a court of record, try a charge of murder committed under its roof. (7) The right to exclude strangers. Formerly any member could directly object to the presence of strangers, but according to the modern practice he must first call the attention of the Speaker to the matter, when the question of objection is determined by vote. The Speaker, however, has power to order strangers to withdraw.

PROCEDURE IN THE HOUSE OF COMMONS.—(For the necessary quorum see COURT OUT). The customary order of business is as follows: (1) Private business. (2) Presentation of public petitions. (3) Motions for leave of absence. (4) Notices of motions. (5) Questions. (6) Motions for adjournment under Standing Order 10

in order to discuss some matter of urgent public importance. (7) Presentation of Bills. (8) Matters taken at the commencement of public business which must relate to the business of the House. (9) Orders of the day and notices of motions as set down on the notice paper for the particular day. *Motions, amendments, questions, and divisions* are to be found as far back as the sixteenth century, and in the seventeenth century their form was in all essentials the same as at the present date.

Motions.—An important distinction is to be noted between those which require previous notice and those which may be moved without notice. As a rule motions which relate to matters of substance require to be known beforehand. The prin. cases in which notice of motion must be given are: the introduction of a new clause upon the report stage of a Bill (see below); the nomination of members to serve on select committees; (see COMMITTEES, PARLIAMENTARY); the grant of leave of absence to members; the presentation of a Bill without an order of the House; and a motion that the House go into Committee of Supply. Formal or uncontentional motions do not require to be notified beforehand, e.g. a motion for the first reading of a Bill from the upper House; for the consideration of the Lords' amendments to a Bill on a future date; for the issue of a new writ to fill a vacancy; for the adjournment of the House or a debate; or, in committee, a motion to report progress, or that the chairman vacate the chair. An adjournment motion is very effective if allowed, but an examination of the list. of parl. proceedings shows that it is difficult to secure a debate on an urgency motion for the adjournment. There exists a body of precedents as to what is 'urgent,' 'definite,' and 'of public importance' in this context, and they have tended to restrict opportunities for discussion on adjournment motions. 'Urgency' motions are those which may be discussed before the opening of public business. If a motion on the adjournment is accepted by the Speaker, it must either be supported by forty members or by the House itself on a div.; and in practice the whole opposition supports the motion. Another kind of adjournment motion is that which is moved every evening at the close of public business and this short debate on the adjournment is generally used to raise individual grievances. Debates on the adjournment, however, are rarely reported in the press so that the member does not get the publicity which he desires (Journings).

Amendments.—An amendment is really a variety of motion. 'It is a subsidiary motion, i.e. a motion for fundamental or partial change in, or curtailment of, or addition to, a motion, already before the House' (Redd.).

Divisions.—The lobbies, called div. lobbies, which communicate by a number of doors with the various parts of the House used by members, play an essential part in divisions. When the Speaker's decision as to the result of a vote by voices

has been stated and challenged by at least two members, the Speaker directs all strangers to withdraw (with the exception of those in the gallery). No member is entitled to take part in a div. unless he was actually in the House when the question was put; but in fact grace is given through the medium of the various div. bells, which resound continuously at this critical moment in all the lobbies and rooms of the House. Any member who desires to abstain from voting, by pairing or otherwise, must, while the bells are ringing, withdraw from the House and the div. lobbies; and he has only two minutes in which to do so, which space of time is measured by a sand-glass in charge of clerks seated at a table for the purpose. Members who enter the House during these two minutes may and must vote. When the time has expired the Sergeant-at-Arms, having previously cleared the lobbies at a sign from the Speaker, locks all the doors leading into the House. The question is then put a second time, and the result by voices may again be challenged; but it is almost impossible at this stage to prevent a div. The Speaker then directs the 'Ayes' to his right and the 'Noes' to his left, and the members thereupon pass the gauntlet of the party tellers (two of whom are the whips), who stand at the doors leading from the lobbies, and the members, according as they pass into the gov. or opposition lobby, thereby declare themselves to be 'Ayes' or 'Noes.' The tellers then count the members as they return into the House from the lobbies, and so ascertain which side is in the majority. Every matter is determined upon questions put by the Speaker and resolved in the affirmative or negative, as the case may be, e.g. 'That this Bill be read a second time.'

Debates.—The rules for the conduct of debates are as far as possible adapted to the curtailment of unnecessary argument. An opposition, even though but little numerically inferior to the gov., has no just cause of complaint against devices like the 'guillotine' (see CLOSURE); its grievance, if it have one, is not with respect to the rules of debate but rather with the party system generally. In the session of 1919 the power of the chair was made independent of any preliminary motion, and, by a standing order then made, the Speaker (or, in committee, the chairman of ways and means) and the deputy chairman were given power in respect of any motion on any Bill, under consideration either in committee of the whole House or on report, to select the new clauses or amendments to be proposed. Consistently with the theory of the will of the majority, no less than with the conduct of any orderly discussion, many of the rules of debate are designed to prevent the revival of a debate which has already been brought to an end, e.g. all references to previous debates in the House during the current session upon any question not under discussion is forbidden, though debates on the earlier stages of a Bill may be referred to in a debate on a later stage. No member is

allowed to speak against or reflect upon any previous determination of the House during the current session except on a motion for rescinding such determination. Similarly no allusion may be made to debates in the upper House. Again no member is allowed to read his speech, though one may well believe that even the best debaters have carefully prepared their greater efforts beforehand. It need hardly be said that reasonable and seditious words may not be used; nor may members make personal reflections or insult other members. There is indeed a code of rules which 'aim at depriving debates, looked upon as a combat of words between members, of all needless and injurious bitterness,' and for the most part these rules are obeyed.

The Opposition.—The leader of the opposition has a task of considerable public importance and, under the Ministers of the Crown Act, 1937, is paid a salary of £2000 a year charged on the Consolidated Fund. Thus the gov. by taxation raises £2000 a year in order to enable its prin. opponent to criticise it, but this is an essential part of democratic government, and promotes effective criticism. Yet although he is paid a salary as leader of 'his majesty's opposition,' the leader of the opposition would appear to have no responsibility to the House as distinct from his responsibility to his constituents. The purpose of parl. opposition is to appeal to the 'floating vote.' The opposition does not expect to be able to turn out the gov. by its vote. It hopes to persuade the floating vote to do so at the next general election and, so long as the gov.'s majority holds, the gov. cannot be defeated otherwise than on a 'snap' vote; and it is the function of the gov. so to shape its policy and marshal its forces that it never courts the risk of defeat. The gov. can always reverse a decision by sending out an urgent whip, and getting together its majority; but it is recognised that a defeat is damaging to a gov.'s prestige in the eyes of the floating vote and it is the purpose of the opposition to show that it could manage the nation's affairs much more competently (Jennings). There is of course less loss of prestige in withdrawing an unpopular proposal than in being outvoted on it. The task of an opposition is not merely to see that such of the gov.'s proposals as are objectionable are opposed by speech and vote, to secure concessions on gov. Bills, to compel the gov. by all the methods of propaganda to modify its general policy, and, finally, to create the necessary public opinion against the gov. ready for the next election—it must take part also in the actual process of parl. government. The opposition parties choose the votes to be put down on supply days. By arrangement with the gov. whips the main subjects to be discussed on the addresses from the throne, the long adjournments, and the Consolidated Fund Bills are determined by the opposition whips acting on behalf of the party meeting or 'shadow Cabinet,' as it has been called.

Questions.—Written notice of intention

to ask a question must, unless the Speaker gives special leave to the contrary, be delivered to the clerk of the House. An asterisk is affixed to the notice where an oral answer is required. Where there is no asterisk, or the member or a friend of his is not in the House to put the question, or the question is not reached by 3.45 p.m., the minister who has to answer it has the answer printed and circulated with the votes. Questions may, however, be postponed by the questioner. Opinions must not be asked, and purely legal questions are not allowed. No imputations on private character are permitted, and imputations on official character may only be made with certain reservations; neither is argument nor irony tolerated for a moment. No questions can be put as to matters pending in a committee until the report of that committee is issued. The Speaker is the sole judge of the propriety of a question. Ministers may decline to answer questions on the ground of public policy, and in any case questions to ministers must relate to their respective depts. The foreign minister has great licence allowed him in the matter of answers. Sometimes a question is the only means of securing redress of an individual grievance which a member has already put before the appropriate minister without securing satisfaction. Originally a question was asked in order to get an answer to that particular question; but to-day questions are often merely pegs on which to hang a more insidious 'supplementary.' The answers to questions on the order paper are prepared by civil servants, but a minister must necessarily answer 'supplementaries' on the spur of the moment out of his imagination unless his dept. has been able to anticipate the questions or his parl. private secretary, by liaison work with the departmental officials in the official gallery, can help him. But there is no obligation to answer a 'supplementary' question.

Discussions of Estimates.—The discussion of estimates comes on at the conclusion of the debate on the address from the throne (see *UNDER COMMITTEES, PARLIAMENTARY*). Until recently twenty days were allocated for their discussion, and at the conclusion of that time they were voted on without further discussion. An estimates committee was instituted in 1922 to meet the view of members that the period of twenty days available for the discussion of ever-increasing burdens of expenditure presented by the gov. to the House was altogether inadequate. When the estimates are under discussion members cannot move an increase, but if they desire increased expenditure, they must do so in the form of a motion to reduce the salary of the minister in charge of the particular estimate. The financial year commences on April 1, and the chancellor of the exchequer generally introduces his budget at or about that date. When the budget resolutions have been passed they are embodied in the Finance Act of the year; the allocation of the revenues

made in committee of supply are embodied in an Act called the Appropriation Act. Money required by the Treasury in the meantime is obtained on the authorisation of Acts called Consolidated Funds Acts. (As to money Bills, see also *PARLIAMENT ACT, 1911.*)

Bills.—1. *Public Bills* (other than money Bills and Bills dealing with the representation of the people).—The first reading of a Bill is a matter of form only, and nothing more than a bare explanatory statement is given even if the Bill is likely to be opposed. The Bill is then printed and circulated. The second reading is the all-important stage, when the main principles are discussed. The member in charge may mention any day he chooses for the second reading, but if it be not reached that day (as it most assuredly will not be), he may put it down for a subsequent day. But if any one opposes the Bill it can only be read a second time on one of the days fixed for taking opposed Bills. It is for the gov. to arrange the order of business, and consequently the days set apart for private members' Bills are so limited that priority is balloted for. When a second reading is opposed, the opposer moves 'that it be read a second time on that day six months,' and if this motion be carried, nothing further will be heard of the Bill that session. It need hardly be said that the exigencies of party government, as it exists at the present day, give the private member very limited facilities for bringing before the House any question in which his constituency may be specially interested, though, in recent years, there have been some slight changes in the standing orders in the matter of allocating parl. time to private members. The overwhelming control exercised by the ministry over the time of the House to the exclusion of the private member is as marked to-day as ever it was. It may be said that no opposed Bill has the slightest chance of passing into law unless the ministry choose to give it special facilities, and even if a private member's Bill does pass its second reading, it becomes indefinitely shelved. Further, even if the member confines himself to a resolution in order to test the opinion of the House, he will not be able to do so unless the Speaker accepts the closure at the end of the debate, so that a div. can be taken; but, even if the Speaker allows the closure, the gov. itself can put up a spokesman to move a shelving amendment so as to obviate a div. on what it considers an inconvenient resolution. 'Blocking motions,' put down at the last moment, are also a favourite device for burking inconvenient discussions, while the method of raising questions by a motion for the adjournment of the House is fenced round with a veritable wall of restrictions. To continue the statement of the orthodox procedure on a public Bill at the point of digression above: When a Bill has been read a second time it is referred to a standing committee unless the House otherwise orders (see *COMMITTEES, PARLIAMENTARY*). After all the clauses are disposed of one way or another, the Bill is reported to the House,

and then considered by a committee of the whole House, and is put down for third reading if it passes without amendment; if not it must be set down for consideration on report.

On the report stage it may be amended as in committee, the new clauses being taken first in order. After being considered on report, it is ready for third reading, when only verbal amendments may be moved, though the Bill, as a whole, can be opposed. It is then sent to the House of Lords, where the procedure is not dissimilar. If the Commons do not assent to the Lords' amendments a committee is appointed to draft reasons. If the Houses cannot ultimately agree the Bill is lost; if otherwise, it receives the royal assent, which is usually signified by commission.

II. Private Bill Legislation.—The procedure on private Bills is of a quasi-judicial character, and it requires that full notice should be given in order to give interested parties an opportunity of opposing. When the Bill is referred to a committee, counsel and witnesses are heard on behalf of the contending parties. Proposals for private Bills must be publicly advertised in certain newspapers in Oct. and Nov.; plans, sections, and books of reference must be left with the authorities in the private Bill office; owners and occupiers of land affected by the proposed scheme must be served with notices, and a deposit of money made by the promoters (see PARLIAMENTARY DEPOSITS; PARLIAMENTARY AGENTS). The next step is to deposit the petition for the Bill, or a copy of the Bill itself, in the private Bill office. After the examiners have seen that all standing orders have been complied with, the chairman of ways and means, and in the Lords, of committees, fix in which House the Bill is to be considered first. The procedure which then ensues is of a most intricate nature. Ordinarily when a private Bill has passed its second reading it goes to the committee of selection, who refer it to one of the small committees on private Bills. Generally speaking in every separate stage, private Bills, when they come before either House, are treated as if they were public Bills. They are read as many times, and similar questions are put, unless otherwise directed by the standing orders. A special procedure has been provided for Scottish private Bills by the Private Legislation Procedure (Scotland) Act, 1899.

See also GOVERNMENT; BRITISH COMMONWEALTH.

See H. R. von Gneist, *The English Parliament*, 1886; C. B. Smith, *History of the English Parliament*, 1922; W. Stubbs, *Constitutional History of England*, 1896-97; A. L. Lowell, *The Government of England*, 1908; J. Redlich, *The Procedure of the House of Commons*, 1908; Sir T. E. May, *Constitutional History of England* (ed. and continued to 1911 by F. Holland), 1912; A. F. Pollard, *Evolution of Parliament*, 1920; W. Notestein, *The Winning of Initiative by the House of Commons*, 1924; W. I. Jennings, *Cabinet*, 1936, *Parliament*, 1939, and *Manual of Procedure in the*

Public Business of the House of Commons (7th ed.), 1942; J. E. A. Jolliffe, *Constitutional History of Medieval England*, 1937; H. J. Laski, *Parliamentary Government in England*, 1938; D. H. Willson, *Private Counsellors in the House of Commons*, 1940; T. E. May, *Parliamentary Procedure* (14th ed.), 1916; F. Williams, *Press, Parliament, and People*, 1946; A. C. Rossom, *Our House*, 1948; C. Hollis, *Can Parliament Survive?*, 1949; J. E. Neale, *The Elizabethan Houses of Parliament*, 1949, and 'Parliamentary Opposition to Elizabeth' (in *English Historical Review*, vols. xxxi., xxxiv., xxxvi., xxxix.).

Parliament Act, 1911. Bitter have been the struggles between the two Houses over the control of money Bills, and it is now a historical commonplace that representative government in England, and the very liberties of the people, are due in no small measure to the issue of that struggle in favour of the lower House. But in the years immediately following on the remarkable Liberal triumph at the polls in 1906, a real or apparent change had come over the current Liberal conceptions of theories of taxation. With exceptions of no striking kind, the Finance Acts for a very long period prior to the first decade of the twentieth century had done little more than ring the changes on what had become the stereotyped sources of revenue. But Lloyd George, in 1909, following out the growing demand of the Liberal party for an all-round 'broadening of the basis' of taxation, proposed in his great budget of that year to impose a number of highly novel land taxes (*q.v.*), and to enhance the existing liquor duties. The opposition viewed this budget in the light of a flank attack on landlords and brewers, designed not primarily to raise revenue for current expenditure but in reality to drive in the thin end of the wedge of land nationalisation on the one hand and, on the other, to cripple the resources of an influential body of Conservative supporters, under the pretext of making people sober by Act of Parliament. The budget was, therefore, declared by its opponents to be not a money Bill at all, but a mere 'tacking' measure, and on it becoming clear that the upper House would never pass it, the ministry resigned, and were returned, though with a greatly reduced majority. The budget then became the Finance (1909-10) Act, but it was patent that fundamental Liberal legislative proposals, notwithstanding party majorities, would seldom become Acts if an unwilling assent could only be extorted from the upper House after constant appeals to the electorate. There were moreover at this time certain other legislative proposals mooted which formed the very life-blood of the advanced Radicals: home rule, Welsh disestablishment, plural voting, and so forth, proposals which it was useless to attempt to pass in the House of Lords. Believing, rightly or wrongly, that the House of Lords intended always to thwart Liberal measures, whatever their merits or demerits, the Liberals postponed all other business to the task of

destroying once and for all the unfettered legislative power of the upper chamber. The controversy was the all-absorbing topic in Parliament from Nov. 1910 to Aug. 1911, in which month the P. A. became law. All parties were agreed, though for very different reasons, that the House of Lords stood in need of reform, but whereas a section of the Unionist party late in the day was not averse to a reconstitution of the upper chamber, the Labour and Irish parties demanded its total abolition. Between these extremes a *via media* by consent was sought in vain. In Nov. 1910 Parliament, after the failure of a secret conference of four Liberal ministers and four Unionists, was dissolved on the advice of Asquith and Lord Crewe, who secured a promise from the king to exercise his constitutional power to override the resistance in the House of Lords by a practically unlimited creation of new peers 'in the event of the policy of the government being approved by an adequate majority' in the next House of Commons. Meanwhile the Unionists availed themselves of the time intervening before the dissolution by presenting a belated scheme of reform to Parliament, the prin. proposals of which provided the settlement of lesser differences between the two Houses by joint sittings and of issues of great gravity by the process of a referendum. Lord Rosebery also endeavoured to stem the tide with a resolution declaring that the House of Lords should in future consist only of peers: (a) Chosen by the hereditary peers from within their own ranks; (b) nominated by the Crown; (c) chosen or sitting *virtute officii*, or by reason of specified qualifications. The various counter-moves did not, however, avail to return the Unionists, and in Feb. 1911 the Parliament Bill was introduced into the House of Commons by Asquith, and after some five or six months of debate in Parliament the Bill was accepted by the House of Lords. The House of Lords tried every possible device, in the shape of amendments and counter-proposals, to thwart the passage of the Bill, but the threatened influx of an unlimited number of new peers took the heart out of most of the opposition, with the exception of a somewhat mock-heretic group who were lampooned in the Radical press as the 'Die-hards' (*q.v.*). The ultimate voting in the House of Lords, in spite of the 'Die-hards,' was 131 to 114 in favour of the Bill. The provisions of the Act, other than the preamble, are in effect as follows: (1) A money Bill which has been passed by the House of Commons and sent up to the House of Lords at least one month before the end of the session becomes law a month after being so sent up, however the House of Lords may deal with it. A money Bill is defined to mean 'a public Bill which in the opinion of the Speaker of the House of Commons contains only provisions dealing with all or any of the following subjects, namely, the imposition, repeal, remission, alteration, or regulation of taxation; the imposition for the payment of debt, or other financial purposes, of charges on the Consolidated

Fund, or on money provided by Parliament, or the variation or repeal of any such charges; supply; the appropriation receipt, custody, issue, or audit of accounts of public money; the raising or guarantee of any loan or repayment thereof, or subordinate matters incidental to those subjects or any of them.' But the expressions 'taxation,' 'public money,' and 'loan' respectively do not include any taxation, money, or loan raised by local authorities or bodies for local purposes. The Speaker certifies money Bills, and his certificate is conclusive and may not be questioned in any court of law. If a financial measure contains new administrative machinery or administrative powers other than those specifically set out in the above definition, it cannot be certified. It may be noted here that of the twenty-nine Finance Bills between 1913 and the end of 1937 only twelve were certified as money Bills. The common notion that by tacking provisions to a money Bill the Commons could pass extreme legislation in a single sitting without the consent of the House of Lords is untrue. It derives from Unionist propaganda in 1911 and since, and is not justified by the terms of the Act or by the practice. The allegation about tacking is, in fact, an allegation that a Speaker might be found ready to pervert the meaning of the definition in the interests of a "progressive" government, and all the traditions of the office are against any such method of decision' (Jennings). (2) When a Bill, which is not a money Bill, is passed by the House of Commons in three successive sessions (whether of the same Parliament or not) and is rejected by the House of Lords in each of those sessions, it is to become law (unless the House of Commons direct to the contrary), provided that two years have elapsed between the date of the second reading in the first of those sessions in the House of Commons and the date on which it passed the Commons in the third of those sessions. A Bill is deemed to be 'rejected' by the House of Lords if not passed by them either without amendments or with such amendments only as may be agreed to by both Houses. The need for these separate sessions is not a substantial limitation, because the gov. could by prerogatives reduce the duration of the sessions at pleasure, and could rigidly limit debate by the guillotine. (3) The maximum duration of Parliament is reduced from seven to five years.

In 1917 the Coalition Gov. called a conference of members representing all parties under Lord Bryce to examine the question, but no final agreement was reached. It was tentatively agreed that the hereditary peers should form only a minority of the second chamber and that there should be no property qualifications. But most acute differences arose over the question of the powers of the House, some members favouring the referendum, others the machinery of joint sessions. After the failure of this conference the gov. introduced resolutions into the Commons in 1922 for reconstituting a House of

Lords of 350 members, with statutory limitations on the numbers, respectively, of hereditary, elected, and nominated peers, and also providing that the decision of what constituted a money Bill should be left to a standing joint committee of both Houses. But these resolutions were more remarkable for the questions they left unanswered than those they purported to settle, and it is not surprising that they were defeated. In 1933 the marquess of Salisbury introduced a Bill to reform the Lords, one provision of which was that the peers should elect to the House 150 of their own order while another 100 should be added from outside; but this Bill too was defeated, and since then the enthusiasm of reformers has waned, though it should be noted that the Labour party at its ann. conference in 1934 formally adopted the policy of abolishing the House. So far no mention has been made above of the preamble to the Act, which announces the intention of the legislature to substitute at a future date a second chamber constituted on a popular basis for the present hereditary House of Lords, and then states the expediency of making provision in the Act itself for restricting the existing powers of the upper House. No such substitution has yet taken place.

The P. A. does not apply at all to private Bills, to Bills confirming Provisional Orders, and to Bills containing any provision to extend the maximum duration of Parliament beyond five years. Experience of the operation of section 2 of the P. A. (up to the end of the Second World War) is limited to the period 1912-1914, during which the procedure of the Act was adopted for Bills dealing with the Welsh Church disestablishment and with the government of Ireland, and also for one or two minor Bills. The most controversial of these Bills was that on the government of Ireland, but both that and the Established Church (Wales) Bill were introduced three times. Ultimately a conference was held on the Irish Bill but no agreement was reached, and eventually the deteriorated international situation involved the necessity of postponing the second reading of an amendment Bill, and no further steps were thereafter taken. The Government of Ireland Act, 1914, never came into force and was repealed by the Act of 1920 (see EIRE). The Welsh Church Disestablishment Act, 1914, was brought into force, with many amendments and after long suspension, by the Welsh Church Act, 1919. In the period 1919-44 the House of Lords was in agreement with the gov. except during the brief tenure of office by Labour Govs. in 1924 and 1929-31. The P. A. is evidently ineffective from the standpoint of those who believe that the true function of the upper House is to thwart 'rash experiments' in public control; for it seems obvious that an extremist gov. could introduce a Bill for the abolition of the House of Lords and then, after that House had disappeared under the P. A., appeal to the electorate on a new programme involving drastic experiments in social reform.

Parliament Bill, 1947.—This Bill amends the Act of 1911 by reducing from two years to one, and from three sessions to two, the period for which the House of Lords may delay the enactment of any Bill which it opposes and antedates the operation of the measure when it should be placed on the Statute Book. The Bill was given its first second reading in the Commons on Nov. 11, 1947. In the committee stage on Dec. 4 an opposition amendment to defeat the provision making the Bill retrospective was defeated by 271 votes to 150, and a Labour proposal to reduce the peers' delaying power to six months was withdrawn. The Bill, which gave rise to a bitter struggle between the two Houses and the main parties, and to the charge by the opposition that the gov.'s motive for introducing the Bill was to facilitate the early nationalisation of the iron and steel industry, was read a third time on Dec. 10 on the motion of the home secretary (Clement Ede), who said that the measure was one which, if the necessity arose, the gov. intended to use in order to secure the passage of controversial legislation. Herbert Morrison, lord president of the council and leader of the House of Commons, who had moved the second reading, admitted that the Lords was a very good revising chamber, but he did not believe it was any more fitted than the House of Commons to gauge public opinion. A Conservative motion for the rejection of the Bill was negatived by 310 votes to 166. The real struggle came in the House of Lords, when the Bill came up in that chamber for second reading on Jan. 27, 1948. Lord Salisbury moved an amendment declining to give a second reading to a Bill which would not modify the basis of the membership of the House of Lords so as to conduce to the more effective performance of its duties. The gov. agreed to an opposition suggestion to adjourn the debate for an all-party conference on the possibility of devising an agreed scheme of House of Lords reform which would embrace the composition as well as the powers of the House of Lords, and Lord Salisbury's motion was accordingly withdrawn. The conference, however, broke down on the question of the powers to be given to a reformed House. Efforts to obtain a basis of agreement failed, although the difference between the negotiators was reduced to a gap of only three months in the period by which the House of Lords might delay legislation, the gov. agreeing to nine months from the third reading in the Commons and the Conservatives insisting on twelve months. The Lords debate on the Bill was therefore resumed on June 8, and the next day a motion for its rejection was carried by 177 votes to 81. The gov., as a consequence, then decided to hold a short session for the reintroduction of the Bill and to resort to the procedure of the Parliament Act (1911) to carry the new Bill into law. On Oct. 31 (1949) the reintroduced Bill was given a second reading in the Commons by 333 votes to 106 and the third reading followed a

fortnight later. It was then submitted to the House of Lords for the third time and again rejected at the end of the month. This ended the long conflict between the two Houses, for under the existing power of the Act of 1911 the gov. was able to present the Bill for the royal assent without the customary 'advice and consent of the Lords Spiritual and Temporal.'

Parliamentary Agent. P. As. are the persons who conduct the business of promoting private Bills and prosecuting proceedings upon petitions against such Bills in Parliament. Various duties and responsibilities are imposed on P. As. by orders of both Houses. No person may act as a P. A. until he has subscribed a declaration engaging to observe the rules and practice of Parliament, and to pay all fees in respect of any petition or Bill upon which he appears, and has entered into a bond, in a penalty of £500 with two sureties of £250 each, to observe such declaration. Persons other than solicitors or writers to the signet must apply in writing to the clerk of the private Bill office in order to qualify as a P. A., and in addition must produce a certificate of respectability from a member of Parliament, barrister-at-law, or solicitor. No person is allowed to be registered as a P. A. unless he is actually employed in promoting or opposing some private Bill or petition pending in Parliament. P. As. are personally responsible to the House and the Speaker (or chairman of committees in the House of Lords) for the observance of rules and orders and for the payment of fees, and the Speaker (or chairman) may, on misconduct, prohibit the P. A. from practising. The private Bill register in the private Bill office, containing the names of the tn. and country agents soliciting any particular Bill, may be inspected by the public. The P. A. in fact performs the useful function of examining Bills on behalf of those who are affected but who have neither the skill nor time to study projected legislation themselves and, in practice, various grouped interests have Bills watched in their interests by P. As. Nearly every collective organisation, including such bodies as the Federation of Brit. Industries, the associations of local authorities, the public utility organisations, and associations of employees employ P. As. to watch their interests.

Parliamentary Commission, see COMMISSION, PARLIAMENTARY.

Parliamentary Committees, see COMMITTEES, PARLIAMENTARY.

Parliamentary Deposits. The standing orders of both Houses of Parliament require that the promoters of railway, tramway, subway, or other private Bills in which authorisation is sought to carry out undertakings which may prove abortive shall make a deposit of money on or before Jan. 15 in the year preceding the proposed passing of the Bill as a guarantee of good faith. The deposit is to be returned to the promoters when non-completion of work is due to want of compulsory powers. No deposit is re-

quired where the money needed for works is intended to be raised on the security of rates and no private profit is to be made.

Parliament, Houses of. The official title for the building generally known as the H. of P. is the Palace of Westminster. The palace built by Edward the Confessor was a walled unmoated building which, in the fourteenth century, is said to have had an area of 12½ ac. and to have housed as many as 20,000 persons, courtiers, craftsmen, artificers, and cooks. This building was considerably damaged by fire in 1512 and Henry VIII., having acquired Whitehall from Wolsey and built St. James's Palace, no longer required it. In 1547 Edward VI. granted its chapel of St. Stephen to the House of Commons, and there they sat until a fire in 1834 destroyed it and the rest of the palace save Westminster Hall, the crypt, chapel, and the cloisters. The foundation of the succeeding building was laid in 1840, the House of Lords first occupied their chamber in 1847, and the whole building was completed in 1852. It was built from designs by Mr. (afterwards Sir) Charles Barry, assisted by A. W. Pugin. The features of the building are the clock tower, containing 'Big Ben,' the central tower, and the Victoria Tower. The chief apartments are those in which the two Houses meet (that in which the Commons met was irreparably damaged in the 1940 air raids on London) and those for the use of the sovereign on ceremonial occasions, the royal court and the royal gallery. A terrace fronts the R. Thames. Westminster Hall and St. Stephen's Hall, which escaped the fire in 1834, have been incorporated. The stone used for the building is magnesian limestone from Yorkshire, and has proved too little immune to the corroding influence of weather and noxious acids, with the result that much stone has had to be removed from the fabric for the sake of safety and considerable expenditure incurred in repairs. There are over 300 statues in the main façade, representing sovereigns, saluts, and patron saints. In the sunk garden on the W. side is Hanso Thornycroft's statue of Cromwell. The clock tower is some 320 ft. high to the top of the spire. The dials of the clock are 23 ft. in diameter, the figures 2 ft. long, and the minute spaces 2 ft square, while the hour hands are 9 ft. long; the pendulum is 13 ft. long. The first blow on the bell—'Big Ben'—which weighs 13½ tons, indicates the hour. It was called by this name after Sir Benjamin Hall, who was first commissioner of works when the clock, made by Messrs. Dent, was fixed in 1858. The clock is wound by an electric motor and lit at night by electricity. A light is kept burning in the clock tower while the House is sitting.

The public entrance is by a door in Old Palace Yard. At the top of the staircase seen through this door is the Norman Porch, so called because it was once proposed to place there upon the pedestals the statues of Norman kings. Next is the king's robing-room, where the king assumes his robes before going to the

House of Lords for the opening of Parliament. The Lords sat here after June 1941. An oak dado adorns the room with eighteen panels of carving portraying stories from the Arthurian legend. The chair of state is surmounted by an oaken canopy, carved with the emblematic rose, thistle, and shamrock. From this one passes into the royal gallery, traversed by the king in opening Parliament. Here are Maclise's huge paintings, 'Wellington and Blücher' and 'Nelson,' and Copley's 'Death of Chatham' (whose death, however, did not follow his seizure in the

five galleries available for peeresses, ambas, and other distinguished persons, the strangers' gallery is at the N. end, and there is a press gallery over the doorway. At the far end of the chamber is the Bar, at which the Commons attend to hear the speech from the throne and the royal assent to Bills. The frescoes over the throne represent Edward III. conferring the Order of the Garter on the Black Prince, the baptism of St. Ethelbert, and Prince Henry acknowledging the authority of Judge Gascoigne. Those behind the strangers' gallery are 'The Spirit of



John H. Stone

THE HOUSES OF PARLIAMENT FROM LAMBETH BRIDGE

House of Lords for many weeks. Beside the doorways are gilded stone statues of King Alfred, William I., Richard I., Edward III., Henry V., Queen Elizabeth, William III., and Queen Anne.

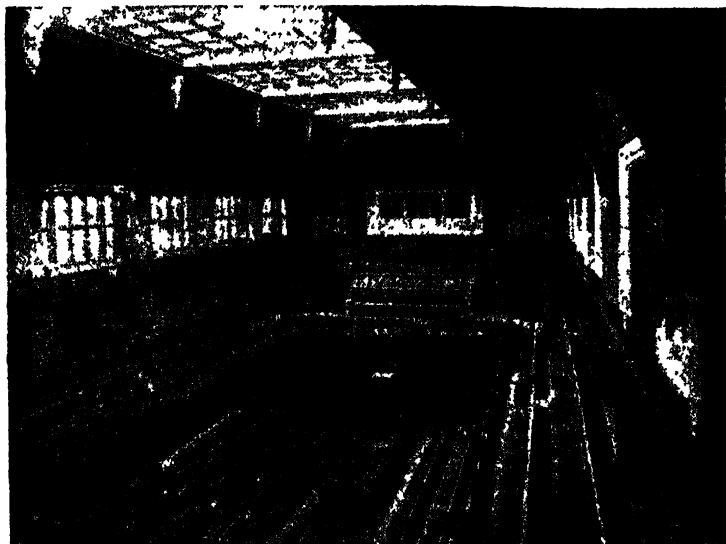
The next room, the Princes' Chamber, is an ante room to the House of Lords. Its chief features are a massive statue group of Queen Victoria, bas-reliefs of historic events of the Tudor period and a series of Tudor portraits by students of the Royal School of Arts. Kensington Palace, the House of Lords, occupied by the Commons after June 1941, is the most impressive and ornate apartment in the whole palace. The throne is beneath an ornamental canopy divided into three compartments, the central one projecting over the two chairs of state, behind which is some fine heraldic carving. In the centre below the throne is the woolpack (now stuffed with hair), the seat of the lord chancellor as Speaker of the House. There are

Justice (Maclise). The Spirit of Religion, and The Spirit of Chivalry (Maclise). The House of Lords lobby is notable for the fine stone carving and the doors of oak, mounted with brass. The peers' corridor, which is next reached, has paintings of events during the Stuart period; the E. corridor is adorned with frescoes depicting episodes of the Tudor period. Thence one passes to the lower waiting hall and, on the left, a model of the old Palace of Westminster, with a statue of John Bright and Bernini's bust of Cromwell.

Thence, turning left, through a long book-lined corridor, and left again through a portrait gallery, is reached the site of the House of Commons. The gov. side of the House was to the right of the Speaker's chair and the opposition to the left. The seating accommodation was formerly for 363 members below and for eight-two in the galleries. The members' lobby contains statues of Sir Wm. Harcourt and

Joseph Chamberlain. Thence one passes through another corridor with frescoes of historic incidents of the Stuart period, and thence, turning right, enters St. Stephen's Hall. This stands on the site of St. Stephen's Chapel, founded by King Stephen c. 1141, partially destroyed by fire in 1298, rebuilt by Edward III. in the Gothic style, and completed in 1361. The chapel contains a number of statues of old-time debaters, including Selden's monument and statues of Chatham and Pitt. On either side of the doorways are statues

and worked by wood-carvers in London, has been bleached a grey colour. The House of Commons table is to be made of oak from Canada, and the dominions have also given some other wood furniture, including the Speaker's chair and the clerks' chairs. The main contract for the superstructure of the new building was due for completion in April 1930, and by the beginning of 1933 all the steel work was in place. As to the architectural character of the new House of Commons, the object of the design is to blend the new



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THE NEW HOUSE OF COMMONS, 1930: FROM A MODEL

A general view of the chamber, looking towards the Speaker's chair from the south-east corner of the strangers' gallery.

of early kings and queens of England, and at the E. and W. ends are two large mosaic panels relating to the hist. of the chapel. The mosaic at the E. end, symbolising St. Stephen's martyrdom, was unveiled in 1926, that at the W. end, portraying Edward III. with the master-mason of the chapel, in 1926. More recent mural panels of Eng. hist. were unveiled by Mr. (later Earl) Baldwin in 1927.

The new House of Commons, now in process of rebuilding, was designed by Sir Giles Gilbert Scott. Quarries in the Clipsham dist. near Stamford have provided the stone, which was shaped by masons at Cambridge and Peterborough as well as in London. The internal panelling and joinery is of Eng. oak from trees grown within a radius of about 50 m. of Newport, Shropshire. The oak, after being kilned by the most modern process

work with the old and preserve a certain unity, yet at the same time break away to some extent in the ornamental detail of the interior. The new chamber is designed to be almost a replica of the old, except for the galleries at the N. and S. ends, which are enlarged. Two new floors below the chamber will provide rooms for individual members, and also secretarial and conference rooms. For the first time there will be a suite of offices over the chamber. The whole of the construction under the old House of Commons was occupied by the vast ventilating space, 20 ft. deep. Modern methods make it possible to get all the ducts and machinery for ventilating into 6 ft. of depth under the chamber, leaving 20 ft. to spare for two new floors. The National Physical Laboratory advised on acoustic problems, including the treatment of the

ceilings for sound absorption and amplification. See also WESTMINSTER HALL.

Parma: 1. N. prov. of Italy, bounded N. by Cremona and S. by Massa e Carrara. The R. Po flows along its N. boundary. Area 1334 sq. m. Pop. 401,800. 2. Cap. of the above prov., built on both banks of the Parma, 76 m. S.E. of Milan. Probably Etruscan in origin, and in 183 B.C. colonised by Rome. P. is of a circular form, and is surrounded by walls and ditches flanked by bastions; the streets are straight and wide and meet at right angles, the chief of them, a part of the Rom. Via Emilia, crossing the city from E. to W. P. is celebrated for its churches, the chief of which are the Duomo or cathedral (consecrated A.D. 1106), built chiefly in the Lombard style, having the interior adorned with magnificent frescoes by Correggio and paintings by other artists, and surmounted by a beautiful dome; the Battistero, or Baptistery, one of the most splendid in Italy, begun in 1196 and completed in 1251; and the church of the Madonna della Steccata, containing the famous painting of 'Moses breaking the Tables of the Law,' by Parmigianino. P. has also a univ. and an observatory. Silk is manufactured, and there is trade in cheese, cattle, and grain. P. emerged from the Second World War relatively undamaged, apart from the area around the railway station, and all important works of art had been previously stored in safety. Pop. 122,800.

Parma, Duchy of. The former duchy of P. was created in 1545, when Pope Paul III. (Alexander Farnese) invested Pier Luigi, his nephew, with the duchy of P. and Piacenza. There were eight dukes of P. of the Farnese line, and, after the line failed, the duchy was chiefly in Sp. hands. It twice came, for a time, under Austrian rule, until its conquest by the Fr. revolutionary armies in 1796. At the Congress of Vienna it was assigned to Maria Louisa, the wife of Napoleon, who was named duchess of P., Piacenza, and Guastallo. Later the duchy fell to the duke of Lucca. Finally, after the battle of Magenta, the Austrians left the duchy, which then became a part of the new kingdom of Italy.

Parmenides (Παρμενίδης) (b. c. 540 B.C.), anct. Gk. philosopher, a native of Elea in Italy. He visited Athens, where he made the acquaintance of Socrates. He was much admired both by Plato and Aristotle, and was a follower of Xenophanes, whose successor he was in the Eleatic school. His views, which are contained in a didactic poem *On Nature*, were that sense is delusive, and that only by mental abstraction it is possible to know the only reality, an eternal unchanging being. His great importance in the beginnings of Gk. philosophy lies in his recognition, along with Heraclitus, of the problem of reconciling the seemingly very opposite notions of the one and the many. The conception of the identity and permanence of reality, which in Xenophanes is merely the result of poetic intuition, became, with P., a well-defined doctrine with impressive consequences. Yet of all

philosophical systems, his is the most paradoxical, for it is founded on the absolute denial of change and multiplicity, and their reduction to pure illusion. With P. only the One exists and that One is eternal, immutable, immovable, indivisible, and infinite.

Parmenion (Παρμενίων) (d. 330 B.C.), a famous Macedonian general. He was held in high esteem both by Philip and Alexander, the former of whom he served in the siege of Halus in 316 B.C. He also took part in the battles of the Granicus, Issus, and Arbela, and being in command of the left wing of the army greatly distinguished himself. After the conquest of Drangiana his son, Philotas, was accused of plotting against Alexander's life, and the king, believing P. to be involved in the conspiracy, ordered him to be assassinated in Media.

Parmeniera, genus of fruit-bearing trees of the order Bignoniaceae, which flourishes in tropical countries. *P. cerifera*, which is known as the candle tree, is a typical example.

Parmigiano, Girolamo Francesco Maria Mazzola (1503-40). It. painter called Parmigiano or Parmigianino, b. at Parma, an able exponent of the Lombard school, and the most distinguished of those who followed the style of Correggio. In 1523 he went to Rome to follow his studies, and was soon employed by Clement VII. He was in that city when it was stormed by the imperialists under Bourbon in 1527, and, it is said, was calmly at work on his picture of 'The Vision of St. Jerome' (now in the National Gallery, London) when soldiers, bent on pillage, burst into his studio. He was, however, protected by their leader. Having engaged to execute sev. extensive frescoes in the church of S. Maria Steccata, after repeated delays he was thrown into prison for breach of contract, and on being released he fled to Casal Magliore, in the ter. of Cremona, where he died soon afterwards. Vasari attributes his misfortunes and premature death to his passion for alchemy; but this oft-repeated story has been disproved. He executed sev. etchings, and some wood-cuts are attributed to him.

Parnahyba, or Parnaiba: 1. Riv. of N.E. Brazil, rising in the N.E. of the state of Goyaz. It forms the boundary between Piahy (or Plau) and Maranhao, and after a course of 650 m. enters the Atlantic by six mouths. 2. Seaport of Piahy state 175 m. E.S.E. of Maranhao. It is a port of some importance for the export of tropical produce and cattle. Pop. 23,000.

Parnasse, Le, name given to a school of Fr. poets who wrote for a review pub. by Alphonse Lemerre and ed. by Louis X. Ricard, called *Parnasse* and devoted entirely to poetry (1852-93). Among the chief poets were Stephane Mallarme, Verlaque, Lafenestre, and Theuriot. The chief characteristics of the school are beauty of style and plasticity of form, but it was gradually expanded and modified, developing ultimately into the school called Symbolist or Decadent. See M. Souriau, *Histoire du Parnasse*, 1930, and F. Vincent, *Les Parnassiens*, 1933.

Parnassus, mt (8070 ft high) of Phocis, an old Greece, overlooking Delphi, the modern Iyakkoura. It had two principal peaks, Titheora and Lycorea, on the latter of which was the Corycian cave. It was regarded as one of the most holy mts of Greece, being one of the chief seats of Apollo and the Muses. It was also sacred to Dionysus.



L. J. Yell

SHILHURDS OF MOUNT PARNASSUS

Parnell, Charles Stewart (1846-91) Irish politician. He was born at Avondale, Wicklow, entered Parliament as a member for Meath in 1875 and soon became a prominent member of the Irish Home Rule party led in the House of Commons by Isaac Butt, who had founded it. He organised a policy of obstruction, which played havoc with the business of the House, and secured the support of the Fenians. He was in 1885 elected president of the National Land League formed with the object of securing the ownership of land in Ireland for the occupiers. Shortly after the death of Butt in 1879 P. was unanimously elected to succeed him in the leadership of the Home Rule party at Westminster and, because of his great influence over his followers, he was called 'the uncrowned king of Ireland'. In the autumn of 1881 he was imprisoned in Kilmallock Jail for inciting to violence, but he was released in the following May, when an arrangement concerning Irish affairs, called the 'Kilmallock Treaty,' was arrived at with Gladstone. The murder of Lord Frederick Cavendish and T. N. Burke in Phoenix Park, however, upset all plans, though P. of course not only had no connection with the crime, but denounced it in the House of Commons. In 1886, owing to the Conserva-

tives and Liberals being nearly equal in numerical strength, he threw in his lot with Gladstone, and turned out the Conservative Gov. His price was the introduction of a Home Rule Bill, which was brought in and rejected. An appeal to the country resulted in the return of the Conservatives to power. In 1887 he was charged by *The Times* with having been actively concerned in the crimes perpetrated by the Land League. A special commission was appointed, and it was ultimately proved that the documents upon which *The Times* relied were forgeries by Richard Pigott who had sold them to the newspaper. P. was completely vindicated by the report of the special commission. Three years later P. was cited as a respondent in a divorce action brought by Capt O'Shea, a member of the Irish party, against his wife and being found guilty Gladstone publicly stated that it was impossible for P. to remain leader of the Irish party. The majority of the party deserted him and he retired from the leadership. In June 1891 he married Mrs O'Shea. He died in the following Oct. See T. P. O'Connor *The Parnellite Movement* 1889 and lives by R. B. O'Brien 1898, W. O'Brien 1906, St. J. Levine 1925 and H. Harris 1941.

Parnell, Thomas (1671-1755) Irish poet, born and educated in Dublin. He took orders in 1700 and was vicar of Finglas and archdeacon of Clougher. He was a friend of Swift and Pope, a contributor to the *Spectator* and aided Pope in his translations of the *Iliad*. He wrote various isolated poems showing a fine descriptive touch, of which the most important are *The Hermit*, *The Night Piece* and *The Hymn to Contentment*. There is an ed. of his collected works by G. A. Aitken (1894) and all his poems are printed in *Minor Poets of the Eighteenth Century* (Everyman's Library) ed. by H. F. A. Aitken. See life by Goldsmith 1770.

Parnajogi, see Parnaji.

Parochial Schools (U.S.A.) In the main these are institutions maintained by the Roman Catholic Church, although there are also some Lutheran and Episcopal schools. From the very beginning of the American republic in the larger centres of population there was a considerable Roman Catholic element, the Church hierarchy deemed it necessary to maintain its own schools because in the public schools no religious instruction was given. This position was reinforced in the years following 1848 when there was a heavy migration of German and Irish Catholics to the U.S.A. To-day practically every Catholic parish has its own school maintained not out of public funds like the public schools, but from the resources of the Church itself. In the large towns the schools are housed in as fine and up to date buildings as any in their section. The Roman Catholics maintain over 800 elementary schools with 2,141,000 pupils, 2,100 secondary schools with 167,000 pupils.

Parody (Gk *para* 'beside', and *oia*, a song), writing either in prose or verse in which an author's style is copied and his sentiment mimicked in order to

ridicule the original; or in which what is written on one subject is altered and applied to another by way of burlesque. The art is almost as old as literature, as wherever a writer of talent is found, there is also found a parodist. The *Gigantomachia* (of Hegemon or Hipponax) and the *Batrachomyomachia* (Battle of Frogs and Mice), which was ascribed to Homer himself, are among the earliest known Ps. The merciless caricature of Euripides' style presented in Aristophanes, particularly in the *Acharnians*, has never been surpassed for subtlety and humour. P. in Rom. literature occupied a subordinate place to satire, in which it sometimes appeared. Ps. of the extravagances of the time are found in Shakespeare, who was himself parodied by Marston. Dryden was very well parodied by Buckingham in his *Rehearsal* (1672), whilst *The Splendid Shilling* by J. Phillips, although somewhat over-rated, set the fashion of employing the sonorous rhythm of Milton for ludicrous subjects. The best collection of Ps. of the eighteenth century was contained in *A Pipe of Tobacco* (1736), in which J. H. Browne mimicked with very good effect Colley Cibber, Ambrose Phillips, J. Thomson, E. Young, and J. Swift; the *Anti-Jacobin* (1797) of J. H. Frere also contains some good Ps. In the following century the *Rejected Addresses* (1818) of J. and H. Smith contained some exceedingly clever imitations of Wordsworth, Byron, Crabbe, Scott, Southey, Moore, and others, moreover their Ps. were marked by no such bitterness and animosity as was Shelley's *Peter Bell the Third*, a P. of Wordsworth. *The Bon Gaudier Ballads* (1855) of Sir T. Martin and Aytoun, and A. C. Hilton's magazine, *The Light Green* (1872), contain good specimens of Ps. But the palm in this period must be awarded to C. S. Calverley, who, in *Verses and Translations* (1862) and *Fly Leaves* (1872), reached greater heights than any other Eng. parodist; his work is marked by such almost uncanny cleverness of craftsmanship that not only the turns of phrase, but the very turns of thought of his victims seem to have been appropriated. In the last part of the century the *Hephalogia*, or *Seen against Sense* (1880), which was supposed to have been written by Swinburne, Andrew Lang's *Ban and Arrive Ban*, and the *Green Boys* (1893) of 'Q' (Sir A. Quiller-Couch), are worthy of mention; and Owen Seaman, the editor of *Punch*, proved himself in the *Battle of the Boys* (1896) and *Borrowed Plumes* (1902) to be an excellent parodist. In its commonest form, verbal imitation, P. demands no great ingenuity, and it is because that form is so easy that the whole art of P. has fallen into disrepute. A poem like Calverley's *Pillar*, which parodies Lord Tennyson's *The Brook* (1887), is excusable on the plea that in blank verse it preserves in permanent form the spirit and style of Tennyson. Another good example of this, the lowest form of P., is A. C. Hilton's *Heathen Passer*, which parodies Bret Harte's *Heathen Chinee* (1877). The verbal imitation form of P., however, ridiculous style

rather than matter. In its highest form P. aims at the literary merits in some isolated example of the works parodied. It burlesques the salient eccentricities rather than the essential characteristics. As regards prose, *Don Quixote* (1605) parodies most excellently the medieval romance, and some of Thackeray's works, such as *Codlingsby*, are very fair Ps. The *Condensed Novels* (1867) of Bret Harte are still the best examples of prose Ps., though some good work has been done in this direction by Barry Pain, Max Beer-bohm, F. O. Burnand, and Sir Owen Seaman. Of both prose and verse P. Sir J. C. Squire is a master. P. and burlesque are very closely related (for examples of the latter art see BURLESQUE). The best collection of Ps. is Hamilton's *Parodies of the Works of English and American Authors* (6 vols.), 1884-89.

Parole (Fr. from late Lat. *paraula*, Gk. *παράβολα*, story), word formerly in use as the equivalent of verbal or oral, but is now only employed in the legal phrase P. evidence as distinguished from written evidence. In its more common sense it is an abbreviation of the Fr. phrase *parole d'honneur*, or word of honour. This is a military term, denoting a prisoner's promise that he will not attempt to escape, and that if released he will not again take up arms in the war in which he has taken part. It is a rule of international law that prisoners of war may be set at liberty on parole only if the laws of their country authorise it, and that in such case they are bound on their personal honour scrupulously to fulfil the engagements they have contracted, and their own gov. may not require or accept from them any service contrary to the P. given. A prisoner of war cannot be forced to accept his liberty on P.; similarly the hostile gov. is not obliged to assent to the prisoner's request to be set at liberty on P. The punishment for breach of P. is death. (Hague Conference rules, 1907—articles 10 and 11.) The term is also used as an equivalent for password, or used only by officers or inspectors of guard.

Paros, is. of the Grecian archipelago, Cyclades group, in the Aegean Sea, 4½ m. W. of Naxos. It is in shape a low pyramid, consisting largely of one huge mt. of marble (Mt. St. Elias, formerly Mt. Marpessa, 2330 ft.). Parian marble was very famous in olden times for sculptural purposes, and is still used, the existing quarries being about 4 m. to the E. of the cap., Paroikia, or P. (pop. 2500). The bay of Naussa, on the N., affords excellent anchorage. The prin. products of the is. are marble, wine, figs, and wool. P. was first colonised by the Ionian Gks., and was conquered by the Persians in 490 B.C. During the fifth century B.C. it became a member of the Athenian confederacy. The is. of Antiparos is 1½ m. to the W. Pop. 8400.

Parotid Gland, one of the salivary glands. It is situated in front of and below the external ear; its duct (Stensen's duct) is about 2 in. long and opens on the buccal surface of the cheek opposite the

second upper molar tooth. The gland secretes saliva containing ptyalin, potassium, sulphocyanide, traces of uric acid, mineral salts, etc.

Paroxysmal Haemoglobinuria, see **BLACKWATER FEVER**.

Parr, Catherine (1512-48), sixth queen of Henry VIII., was the daughter of Sir Thomas P. (d. 1517) of Kendal. She married Henry VIII. in 1543, and during her reign tried to diminish religious persecution, and showed great kindness to the



CATHERINE PARR

king's children, Edward, Elizabeth, and Mary. She acted as regent during Henry's expedition in France, 1544. On Henry's death in 1547 she married Sir Thomas Seymour.

Parr, Samuel (1747-1825), Eng. pedagogue and author, b. at Harrow-on-the-Hill, son of an apothecary. He was educated at Cambridge, becoming an assistant master at Harrow and headmaster successively at Colchester and Norwich schools. Having taken holy orders, he finally (1785) settled at Hatton, Warwickshire, where he took private pupils. He interested himself in political affairs and became prominent as a pamphleteer. P. was a great Latinist, but left no work to account for the great reputation for ability which he enjoyed in his lifetime. His chief power lay in his literary controversialism, but though he was nicknamed 'the Whig Johnson,' he fell far short of his model. His writings, including correspondence, were pub. in 1828. See W. Field, *Memoirs of the Life, Writings, and Opinions of Samuel Parr*, 1828; H. J. Nicol, in *Great Scholars*, 1880; and P. Colson, *Private Portraits* 1948.

Parr, Thomas (c. 1482-1635), 'Old P.' was a native of Albury, near Shrewsbury. He is said to have lived to the age of 162, and his longevity has been celebrated by Taylor the 'Water-poet.'

Parr, William, see **NORTHAMPTON, MARQUESS OF**.

Parr, see **SALMON**.

Parra, see **JACANA**.

Parrakeet, see **PARAKEET**.

Parral, see **HIDALGO DE PARRAL**.

Parramatta, tn. of New S. Wales, Australia, on the P., 14 m. W. of Sydney, after which it is the oldest tn. in the colony. It is noted for its orchards and orange-ries. The manufs are colonial tweeds, P. cloths, soap, etc. Pop. 19,000.

Parratt, Sir Walter (1841-1924), Eng. organist, b. at Huddersfield, son of the par. organist, and educated privately. From 1854 to 1861 he was organist at St. Paul's Church in his native tn., and in 1872 was organist of Magdalen College, Oxford. He became organist at St. George's Chapel, Windsor, in 1882, holding office until his death. In 1892 he was knighted and made Master of the King's Musick. He was also prof. of music at Oxford (in succession to Sir H. Parry), 1908-18, and from 1916 to 1920 dean of the faculty of music in London Univ. Prof. at the Royal College of Music he conducted choral classes. P. composed music for the production of *Agamemnon* at Oxford, 1880, as well as for the *Tale of Troy* and *The Story of Orestes*, and also odes, anthems, songs, and organ pieces, as well as various compositions on the occasion of royal weddings and other state ceremonies. He had much influence upon the development of organ-playing in England. See life by D. F. Tovey, and G. Parratt, 1942.

Parrhasius (Παρρᾱσιος) (fl. 400 B.C.), famous Gk. painter, was the contemporary and rival of Zeuxis. He was a native of Ephesus, but spent most of his time in Athens, and is ranked among the greatest Attic artists; indeed he is said to have done for painting what Phidias did for sculpture. His picture of the Athenian Demos is famous, and his study of Theseus adorned the Capitol in Rome.

Paricide (Lat. *parricidium*, from *pater*, father, and *cedere*, to kill), crime of murdering a parent or a near relation. In Rom. times the law against P. was very severe, special punishments being reserved for those who were found guilty. In some countries there may be a tendency even to-day to treat any one guilty of P. with greater severity than other murderers, but the Eng. law makes no distinction.

Parrot (Pittaci), group of about 600 birds, most abundant in the warmer parts of Australia and S. America, though numerous in other tropical countries. They include a number of widely divergent forms and details of organisation. The plumage is often gorgeously coloured, but a few are soberly tinted. Most of them are arboreal in habit, but the owl P. or kapo of New Zealand is flightless and lives usually on the ground, though it can still climb trees. Another New Zealand P. differs from the rest of the group in having developed carnivorous habits. The characteristic large and powerful, much-curved bill, with its elongated tip, is well adapted in most Pa. for tearing up fruit and cracking nuts, and in a number of species the tongue is highly specialised for extracting honey by means of a

brushlike tip. Many species are favourite cage-birds. The best talker is the African grey P. (*Psittacus erithacus*), a bird of from 10 to 12 in. long; with the exception of the short, broad tail, which is bright scarlet, the plumage is pearl-grey in colour. The sexes are hard to distinguish, and as males are rarely imported it is almost unknown for it to breed in captivity. Many Amazons are imported; one of the best talkers is the brilliantly coloured blue-fronted Amazon. A P. is taught to talk by repeating words slowly and distinctly over and over again, preferably from a place of concealment. Variety of food is necessary and should include fruit, but little or no meat, if outfishish bone is excepted. Water for drinking is required in spite of a popular idea to the contrary, and many Ps. like bathing water. Grit in the form of clean gravel is also essential for digestive processes. See W. T. Green, *Parrots in Captivity*, 1884.

Parrot Fishes, or **Parrot Wrasses** (Scaridae), group of fish in which the teeth of the jaw have coalesced to form extremely hard beaks which are able to bite off pieces of coral; these, as well as seaweed and molluscs, form the prin. food. There are eight genera, with 110 species. They are all brilliantly coloured, and some attain a length of 4 ft. *Scarus cretensis*, a Mediterranean species, was much esteemed by the ancients.

Parry, Sir Charles Hubert Hastings (1848-1918), Eng. musical composer, b. at Bournemouth. Educated at Eton and Oxford, after leaving the univ. he studied music under Sterndale Bennett and Macfarren. He was appointed prof. of composition and musical hist. at the Royal College of Music, 1883, and director, on the death of Sir George Grove, in 1894. The five scenes from *Prometheus Unbound* show richness of harmony, and his mastery of choral work appears in *Blest Pair of Sirens*; *Job* is perhaps his work of greatest strength. This early promise, however, was not wholly fulfilled, due doubtless to the distraction of his office as head of the Royal College of Music. Spontaneity and a sense of constructive purpose are lacking in *War and Peace* and *Voces Clamantium*, though they appear in *Ode on the Nativity* and in the organ works such as the *Wanderer* toccata and fugue and *Ye Boundless Realms*. His literary works include *Studies of Great Composers* (1887); *The Art of Music* (1893); and *Style in Musical Art* (1900, 1911). Among his other compositions are *L'Allegro and Il Penseroso*; *Music to the Birds of Aristophanes*; *Music to the Frogs of Aristophanes*; *Music to the Agamemnon of Aeschylus*; *Judith*; *King Saul*; *Te Deum*; *Invocation to Music*; *A Song of Darkness and Light*; and *The Vision of Life*. Most popular compositions are *Jerusalem* and various sea-songs. See R. A. Streitfeldt, *Hubert Parry*, 1913, and C. L. Graves, *Hubert Parry: His Life and Works*, 1928.

Parry, Sir Edward Abbot (1863-1943), Eng. judge and author, b. in London. Co. court judge at Manchester, 1894-1911,

then at Lambeth, retiring in 1927; president of the Pensions Appeal Tribunal, 1917-18. His plays include *Kalavampus* (children's play, in collaboration with Louis Calvert, 1895, produced in 1901); *England's Elizabeth* (with Calvert, 1901); *What the Butler Saw* (with Frederick Mouillot, 1905). Other pubs.: *Letters from Dorothy Osborne to Sir William Temple* (1887, 1902); *Pater's Book of Rhymes* (1901); *What the Judge Saw* (1912), and *What the Judge Thought* (1922), both reminiscences; *The Law and the Poor* (1914, intended to promote certain legal reforms); *The Law and the Woman* (1916); *The Drama and the Law* (1924); *The Overbury Mystery* (1925); *The Gospel and the Law* (1928); *Herrington* (1928, a novel); *The Bloody Assize* (1929); *My Own Way: an Autobiography* (1932). P. will be remembered longer as an author than as a lawyer, although he did excellent work in his profession.

Parry, Sir William Edward (1790-1855), Eng. sailor and explorer, b. at Bath. He did good service in preparing the way for the eventual discovery of the N. pole. P. commanded sev. successive expeditions to the Arctic, where he reached a lat. beyond the furthest N. of his own day. The charts he made of the N. seas were very valuable to contemporary navigation. He was voted a sum of money by Parliament for his services to science, and was made hydrographer to the Admiralty, and later rear-admiral. P. told the story of his Arctic expeditions in his own journals, and the accounts of his voyages in the *Fury* and the *Hecla* (pub. between 1819 and 1823) form an interesting chapter in the hist. of the conquest of the N. pole. It was due to his skill and resource that the passages of Lancaster Sound and Barrow Strait, Prince Regent's Inlet, and Wellington Channel were discovered. A memoir was pub. by his son, Edward P., in 1857.

Parry Islands, group in the Arctic Ocean belonging to Canada, W. of Baffin Bay and N. of Lancaster Sound, Melville Sound, and Barrow Strait. The P. I. include Owen, Bathurst, Melville, Cornwallis, and Prince Patrick Is., are covered with tundra, and are uninhabited. Sir W. E. Parry, after whom they are named, visited them in 1819, and the expeditions searching for Franklin explored them further.

Parry Sound, tn. of Ontario, Canada, 221 m. W. of Ottawa, on Georgian Bay (Lake Huron), with lumbering industry. Pop. 4000.

Parsec, unit of astronomical distance; the distance of a star of parallax (q.v.) one second, i.e. $3\frac{1}{2}$ light-years, or 19 million million miles, generally expressed in the form 19×10^{14} in.

Parsees, see PARSIS.

Parsis (Parsees) are the last remaining branch of the old historic Iranian race. When the Arabs conquered Persia in the seventh century, they fled to India by sea and land rather than give up their anct. religion of Zoroaster, which consisted in the worship of fire, belief in duality of existence, and practice of good thought, good word, and good deed. The P. are

mostly to be found in Bombay, and number barely 100,000 all told. Though the P. have been in India for over 1300 years, they have kept intact their distinct individuality and sturdy independence in habits, customs, and mode of living, which is more W. than E. They are an enterprising race and foremost in the trade, commerce, and industries of India. They were the first to open cotton mills, iron and steel works, and scientific research institutions in India, and from among them came that long line of naval architects who a hundred years ago built ships-of-the-line for the R.N.

The Indian political freedom movement was started by them, and the three members of the Brit. House of Commons have all been P. They were the first to teach non-communalism to Indians by sinking wells and building schools, hospitals, and convalescent homes where all had free access without any distinction of caste, colour, or creed.

There is not an uneducated man or woman among them, and their charitable trusts and institutions are of such dimensions that not one Parsi need go without food, clothes, or shelter if he is unable to provide these necessities of life for himself. Purity being the basic principle of their religion, they keep themselves and their homes scrupulously clean and tidy. Altogether they are among the most enlightened and progressive people among the different races and nationalities of India.

Parsiwan, see **TAJIK**.

Parsley (*Carum petroselinum*), flavouring and garnishing herb. It will grow in almost any soil, but does best in a deep rich moist loam. A single sowing of seed is made in April, and from the seedlings, if kept thin, a supply of plants can be secured for two seasons. P. makes a handsome edging to beds.

Parsnip (*Pseudanum sativum*), native Brit. umbelliferous plant, long valued for its edible tap-roots. It is hardy, and easily grown in deeply dug soil, which need not be rich. The seed, which must be new, should be sown in March, and the seedlings thinned out until the plants are set apart. The roots are ready for use in Oct., but until required may be left in the ground, where their flavour improves.

Parson (Lat. *persona*; *parson* and *person* are the same word, the parson being so called because 'by his *person* the church, which is an invisible body, is represented'—Blackstone), priest of a par. or eccles. corporation; the vicar or incumbent of a par. having the parochial charge or cure of souls. To constitute a P. four requisites are necessary by law, viz. holy orders, presentation, institution, and induction. The P. is in himself a body corporate, in order to protect and defend the rights of the Church by a perpetual succession. During his life a P. has the freehold in himself of the parsonage house, the glebe, the tithes, and other dues. Strictly the rector in holy orders is a P. while the vicar is not. In common usage the term has been widely extended so as to include not only a vicar, and indeed any clergy-

man, but also nonconformist ministers and preachers. In this sense it is used only colloquially, and generally with a somewhat depreciatory significance.

Parsons, Sir Charles Algernon (1854-1931), Eng. inventor and engineer, son of the third earl of Rosse, b. in London, was educated privately and at St. John's College, Cambridge. He is best known in connection with the steam-turbine which bears his name, and which he rendered suitable for the generation of electricity and the propulsion of vessels. The first turbine was produced in 1884; the torpedo boat *Turbinia* was the first to be fitted with turbine engines. He was made a fellow of the Royal Society in 1898. Other inventions of his are an improved variety of gramophone and a non-skid device for motor tyres. K.C.B. 1911, O.M. 1927. He received the Copley medal of Royal Society in 1928. He wrote on the turbine and other engineering matters. In 1926 pub. *The Scientific Papers of William Parsons, third Earl of Rosse*. See life by R. Appleyard, 1933, and R. H. Parsons, *The Steam Turbine*, 1916.

Parsons, or **Persons**, Robert (1546-1610), Eng. Jesuit and polemical writer, b. at Nether Stowey in Somersetshire, and entered the Society of Jesus at Rome in 1575, being ordained priest three years later. He and Campion were selected for the work of the Eng. mission, directed chiefly from Douay, and he landed at Dover in 1580; but Campion was arrested and P. had to flee the country. He went back to Rome, whence he continued to direct the Eng. mission, and later went to Spain, where he founded a number of institutions for training Eng. priests. He was a man of great attainments and amazing industry, and notable for his inveterate political intrigues. He played a large part in the policy which eventually led to the dispatch of the Sp. Armada for the invasion of Britain. His great aim was working for foreign intervention on behalf of Eng. Catholics. Among his best-known controversial pamphlets is the *Brief Discourse concerning certain reasons why Catholics refuse to go to Church*. See H. Thurston, *Catholic Writers and Elizabethan Readers*, reprinted from *The Month*, 1894-95.

Parsons, William, see **ROSSE, EARL OF**.
Parsons, city of Kansas, U.S.A., in Labette co., 43 m. W.N.W. from the S.E. corner of the state. It is the centre of a rich farming dist., and there are car and machine works. Pop. 11,300.

Parsonstown, now **Birr**, (n. of O.) Irel. co., Elre, 61 m. S.W. of Dublin. It has a boot and shoe factory. Pop. 3,400.

Partabgarh: 1. Cap. of state of same name in Rajputana, India. 120 m. N.W. of Indore. Manus, a particular kind of enamelled jewellery. Pop. (state) 92,000; (tn.) 11,000. 2. Dist. of United Provs., India, covering an area of 1457 sq. m. Bela is the chief tn. Salt, saltpetre, and limestone are mined, and the prin. crops are rice, barley, wheat, millet, and sugarcane. Sugar and silk are manufactured. Pop. 1,041,000. 3. Auct. fortress of Bombay, India, and a stronghold of

Sivaji, founder of the Maratha Empire. It is 8 m. S.W. of Mahabaleshwar in the Satara dist.

Parthenay, tn. in the dept. of Deux-Sèvres, France, on the Thouet, 25 m. N.N.E. of Niort. It has interesting old buildings and anot. ramparts. Pop. 7700.

Parthenius, **Bartān-su**, or **Bartine**, riv. of Anatolia, Asiatic Turkey, the tn. of Bartān, on its banks, being on the site of the anot. vil. of Parthonia. It was the chief riv. of W. Paphlagonia, and formed part of the boundary between Paphlagonia and Bithynia. It rises on Mt. Olgasys and flows N.W. into the Euxine (Black Sea), 10 m. from Amastris.

Parthenogenesis, see under **BIOLOGY**; **FERTILISATION**; **ALTERNATION OF GENERATIONS**.

Parthenon (from *Gk. παρθενος*, a virgin), most celebrated Doric temple of anot. Greece, and one of the finest pieces of architecture in the world, receives its name from its dedication to the virgin goddess Athena. It was commenced about 450 B.C., and was dedicated in 438. Its architects were Ictinus and Callicrates, but the whole of the work was carried out under the supervision of the sculptor Phidias, by whom the statue of Athena Parthenos, which stood in the naos, was executed. The temple is situated on the S. side of the Acropolis at Athens. It is octastyle (with eight columns in front) and pseudo-dipteral (it has only one range of columns at the side). The number of columns along the flank is seventeen, counting those at the corners. Behind the corners of the peristyle are six columns, somewhat smaller in size, by which an excellent effect is produced. The most notable feature in the architecture of the P. is the delicacy of the refinements introduced to counteract various optical illusions. These are to be found everywhere, in the curves of the columns, stylobate, cornice, etc. Often they are so slight as to be revealed only on the most careful measurement. The fine sculptures of the metopes, frieze, etc., were mostly removed to the Brit. Museum by Lord Elgin, the P. having been largely destroyed in 1687. The chief dimensions are as follows (outside measurements): length, 228 ft.; width, 101 ft.; height, 64 ft.; length of naos, 98 ft.; width of naos, 63 ft. The worst of the injuries which the P. has suffered from war and pillage was inflicted in the siege of Athens by the Venetians in 1687, when a bomb exploded in the very centre, and threw down much of both the side walls. Some slight damage, chiefly in the shape of scars and splintering, was caused by shell and mortar fire during the Second World War, and from rifle fire in the succeeding disturbances. There is an immense literature on the P. See the official *Guide to the Department of Greek and Roman Antiquities in the British Museum*, which contains plans of the building. The sculptures are dealt with in H. B. Walters's *The Art of the Greeks* (chap. vi., 31st ed.), 1934.

Parthenope, see under **NAPLES**.

Parthenopean Republic, formed in Naples under the direction of the Fr., in

Jan. 1799. Naples, once called Parthenope, was reoccupied for the Bourbon house by Cardinal Ruffo, the Fr. leaving their protégés to their fate. Nelson then arrived, and, ignoring the armistice concluded between the two sides, sanctioned the execution of sev. republican leaders, including Francesco Caraccioli (q.v.).

Parthia, anot. name of a country of W. Asia, situated to the S.E. of the Caspian Sea, and corresponding to the N. portion of the Persian prov. of Khorassan. The country was primarily subject to Persia, and later to the Seleucids. But in 250 B.C. the satrap Pherecles was slain, and Arsaces, leader of the Parthians, a subdivision of the Dahae, was proclaimed first king of P.; such is the official account, but in all probability Pherecles was satrap of Pataeus, to the N.W. of P. The empire thus started grew in importance, until after the time of its greatest power, under Mithridates I. and II., it extended to the Euphrates, Caspian Sea, India, and Indian Ocean. From the first century B.C. onwards P. waged many wars with Rome, and was at one time her ally and at another her vassal. The Parthian cavalry were very famous, and from their method of shooting as they appeared to retreat comes the expression a 'Parthian shot.' In A.D. 226 the country was annexed to the new kingdom of Persia, founded by Artaxerxes. The cap. of the Parthian Empire was Ctesiphon (q.v.) of which some remains exist. The Lat. poets of the Augustan age use the names Parthi, Persae, and Medi indifferently. See N. C. Debevoise, *A Political History of Parthia*, 1938.

Parting, in metallurgy, the separation of gold from silver by heating with concentrated nitric acid, in which the silver dissolves while the gold remains unaffected.

Partinico, tn. of Sicily, 32 m. S.W. of Palermo by rail. Manufs. silk and woollen goods. Pop. 25,300.

Partisans, see **GUERRILLA WARFARE**.

Partition, in equity (q.v.), the div. of a joint estate in land into separate parts. P. may be effected either by a deed, by agreement between the joint tenants, by order of the Ministry of Agriculture, or by a P. action in the chancery div.; but in the last case the court must, under the Partition Act, 1868, direct a sale instead of P. if tenants to the extent of one-half require it. See also **JOINT TENANCY**; **COMMON TENANCY** IN.

Partition Coefficient. When a substance is shaken up with two immiscible liquids, in both of which it dissolves, it distributes itself between the two liquids in such a way that the ratio of its concentration in them is a constant. This constant is called the P. C. of the substance in these solvents.

Partnership. In Eng. law a P. is the relation which subsists between two or more persons carrying on a business in common with a view to profit. It is essential to an understanding of the Eng. law of P., the fundamental principles of which are to be found in the consolidating Partnership Act, 1890, to distinguish P. from companies and corporations, not-

withstanding that the law of unincorporated companies consists of 'little else than the law of partnership modified and adapted to the wants of a large fluctuating number of members' (Lindley). And the same is true of companies which are incorporated (see COMPANY). In short, though registered joint-stock companies are P.s., they are P.s. of an exceptional nature, and are expressly excluded from the provisions of the Partnership Act, 1890. The prin. differences between companies and P.s. proper are these: (1) A P. is not a distinct entity from the persons composing it, and hence the personal liability of partners for the P. debts is unlimited, although recourse must first be had by the creditors to the P. assets; but the liability of a joint-stock company is generally limited either to the amount unpaid on the shares or by guarantee, and when its assets are exhausted nothing further remains for the creditors. (2) A registered company (other than a private company) may consist of any number of members not less than seven; but a P. may not contain more than twenty, or, in the case of a banking P., ten members. A 'private company' has limited liability and containing as few as two members is now, however, perfectly lawful (see on this at the end of the article on COMPANY; and also COMMANDITE, SOCIÉTÉ EN.). (3) The formation and continuance of a P. depend on the mutual confidence in and personal relationship of the different members to each other, but such a relationship between the shareholders of a company is virtually non-existent. (4) Every partner is entitled, subject to the terms of the P. agreement, to participate in the business; but in the case of companies, the management is delegated to directors, who, in most cases, are in that position mainly by their own appointment, regardless of the wishes of the shareholders. It is not always easy to determine whether a particular transaction constitutes a P. or not; and, in particular, agreements to lend money to a P. must be carefully drawn to avoid the inference that the lender was really a partner. The Act of 1890 is notoriously cryptic on the subject, especially in regard to the inference to be drawn from a profit-sharing agreement. The general effect, according to high opinion, is that sharing profits without more implies a P.; but if there are other facts, these too must be taken into consideration; e.g. if A lent money to B in return for a share of accruing profits, but in no way interfered in or controlled B's business, and had no power to prevent the misuse of the assets, A would probably not be held to be in P. with B. A bona fide loan will not constitute the lender a partner with the borrower; but it must be a loan with a personal liability on the part of the borrower to repay, and the lender must not take an interest in or share of the capital *in specie*, because that of itself would imply a joint interest in or part ownership (i.e. P.) of the capital and profits. In other words, lending on the security of a share in a P. is one thing; contribution towards a joint speculation in return for a propor-

tionate share of profits quite another, and generally conclusive evidence of a P. The Act also provides that the following facts, *inter alia*, do not, taken by themselves, constitute P.: (1) The receipt by a servant of a share of profits by way of remuneration, or by a widow or child of a deceased partner of a portion of the profits by way of annuity. (2) The receipt of a portion of profits by the vendor of the goodwill of the business. (3) The receipt of a debt out of accruing profits.

A written agreement is not essential to the formation of a valid P., and indeed a P. may be inferred from a general course of dealing. But in practice deeds are usually drawn up, and it would be highly imprudent not to guard oneself by some document. Writing, however, is required in the case of a P. which is either intended to last for more than one year, or is only to commence at a future date exceeding a year ahead (see CONTRACT; FRAUDS, STATUTE OF), subject to the effect of part performance. The matters that common prudence demands the settlement of in the agreement are these: (1) The nature of the business. (2) The duration of the P. (3) The firm name. (4) Mode of providing the capital. (5) Banking account and signing of cheques. (6) Management. (7) Accounts. (8) Expenses and profits. (9) Effect of the death of a partner or the dissolution of the firm for any other reason. (10) Provision for the family of a deceased partner. (11) Arbitration. A firm may lawfully carry on business under any name or style, whether those of the partners themselves or not, provided, if they adopt other than their own names, the result is not calculated to deceive the customers of other persons already trading in such name and thereby to deprive another business of profits that would otherwise have accrued to it. It is a moot point whether partners can lawfully carry on a business in their own names if those names are already well known to the public as the style of an existing firm; and all that can be said with certainty is that if the new firm is deliberately trying to pass off its goods or represent its business to be the same as that of the old firm, the latter could get an injunction against the former.

Certain P.s. are unlawful: those against public policy or *contra bonos mores*, e.g. a P. in the profits of a gambling-hell or a bawdy-house; those the membership of which is in excess of the statutory numbers; medical or solicitor P.s. where some of the partners are not properly qualified to practise. A bookmaking P. is not *per se* illegal, but if it was intended to carry it on at a 'place' within the meaning of the Betting Act, 1853, it would be illegal (see GAMING). The prin. legal effect of a P. being unlawful is that the courts will not recognise actions by any of the partners against any of their fellow partners. All the partners in any firm are agents for each other, and each can bind the firm to the extent of his apparent or ostensible authority. Limitations of authority as a rule cannot affect third persons unless they had notice of such limitations, but

only give the firm a remedy against the individual partner or partners who have exceeded those *de facto* limitations. To be within the apparent authority of a partner the act (a) must be done in relation to the P. business; (b) must be incidental to the usual business of the firm: e.g. where the business is not of a commercial nature, or where there is no buying or selling of goods, a partner cannot issue negotiable instruments nor borrow nor pledge the firm property, though he can sign ordinary cheques. The firm would only be liable for an act outside the scope of its business if the partner who did it had express authority to do it, and (c) must be done in the character, not of an individual, but of a partner, or in the firm name or in some other manner indicative of an intention to bind the firm.

Every partner is liable for the P. debts, and the creditor can sue any or all of them; and if he obtains judgment against the firm he may issue execution (q.v.) against the private property of the members if the P. assets prove insufficient. If he chooses to sue one or more partners separately, and obtains judgment, he cannot enforce that judgment against the partners he chose not to sue, nor can he sue such other partners by reason of not obtaining satisfaction against those he did sue. When a partner refuses an agreement by the continuing partners to release him from existing firm liabilities will not release him as against those creditors who do not assent to the arrangement. A new partner is only liable for debts incurred by the firm before he became a member by special agreement. Generally only partners can be responsible for firm liabilities; but if any person by his conduct 'holds himself out' as a partner, he will not be allowed afterwards to deny a role upon the assumption of which outside people may have been induced to give credit to the firm. It is only upon the principle of 'holding out' that a retiring partner can be made liable for debts contracted after his retirement, i.e. if he allows himself to appear to remain a member. To escape future liability he should give express notice of his retirement to habitual customers of the firm, and by a general notice in the *London Gazette*. Only actual members of a firm are liable for the torts (i.e. wrongs independent of contract) of a partner; the doctrine of holding out does not apply to torts, and even an actual member cannot be held responsible for the fraud or other tort of a fellow member of a firm unless the act was (a) within the ordinary course of the firm's business, or done with the other partners' authority; or (b) consisted of a misapplication of funds or other property received by the misapplying partner within the scope of his ostensible authority (or received in the first instance by the firm) and misapplied whilst in the custody of the firm. The ordinary rights of partners *inter se* are generally regulated by agreement. Unless modified by agreement the following rights are implied: (1) To take part in the business; (2) to have the busi-

ness carried on according to the terms of the P. agreement; (3) to be indemnified by the firm against personal liabilities incurred by him in the ordinary course of the firm's business; (4) to be paid interest at 5 per cent on advances by him to the firm beyond the capital he has originally agreed to subscribe; (5) to prevent new partners being admitted against his wishes; (6) to have the firm's books kept at the prin. place of business; (7) to share equally in the capital and profits; and (8) to enjoy the confidence of his co-partners.

A P. may come to an end: (1) At the will of any partner where no fixed term has been agreed on; or (2) by fluxion of the term agreed upon if any; or (3) upon the performance of the venture for the accomplishment of which the P. was formed; or (4) by bankruptcy or death of a partner (unless otherwise agreed upon in the P. deed or agreement); or (5) by the desire of the other partners if one member suffers his share of the assets to become charged for his private debts; or (6) by the fraud of one partner on his co-partners; or (7) by the occurrence of some event causing the P. to become unlawful; or (8) by the decree of the court upon the application of one or more of the partners (a) where some partner has become insane, or permanently incapable, or been guilty of such conduct as makes it impracticable for the others to continue in P. with him; (b) when the business can only be carried on at a loss; and (c) whenever the court thinks it 'just and equitable' to order a dissolution.

Limited Partnerships.—The Limited Partnerships Act, 1907, provides for limited P. of not more than ten persons in the case of banking or more than twenty in other cases who are 'general partners' and who are liable for all debts and obligations of the firm, and of one or more 'limited partners' who will not be liable for the firm's debts or obligations beyond the amount they have contributed to the P. capital. A limited partner may not take part in the management of the P. business and he has no power to bind the firm. But he may, personally or through his agent, at any time inspect the books of the firm and examine into the state and prospects of the business, and may advise with the other partners in such matters. If he takes part in the management of the business he will be liable for all debts and obligations incurred while he so takes part in the management. Any differences arising as to ordinary matters connected with the business may be decided by a majority of the general partners. A limited partner may, with the consent of the general partners, assign his share in the P. A limited partner cannot dissolve the P. by notice. See N. Lindley, *Law of Partnership, including Limited Partnerships* (16th ed. by A. B. Lindley), 1935; Sir A. Underhill, *Principles of Law of Partnership* (5th ed. by E. M. Holland), 1937; and Sir F. Pollock, *Digest of Law of Partnership* (14th ed. by J. W. C. Turner), 1944.

Partridge, Eric Honeywood (b. 1894), Brit. writer, b. in the Waimata valley,

Gisborne, New Zealand, spent his childhood in New Zealand, and then lived in Australia. He served with the Australian forces in the First World War. In 1921 he went to Oxford as Queensland travelling fellow, since when he has lived in England. After being a univ. lecturer in Eng., he founded the Scholaris Press, a publishing firm. P. began to write in 1931 and now enjoys a high reputation for his books on Eng. in general, Eng. usage, and Eng. slang. During the Second World War he served in the army and in the R.A.F. His book, *Words at War - Words at Peace* (1949), incorporates both his war experience and his views on language in general. In particular it shows the effect of war on vocabulary and the odd uses of words which develop. His other pubs. include *A Dictionary of Slang and Unconventional English* (1937) and *Usage and Abuse: a guide to Good English* (1939).

Partridge, John (1614-1715), Eng. astrologer, b. at E. Sheen, Surrey. He pub. a number of pamphlets and books dealing with astrology, and issued an almanack entitled *Merlinus Liberatus* (1670). He also wrote *Astrology at a Glance* (1679), *Flagellus Mercurius flagellatus* (1697); and a trans. of Mynsicht's *Treasury of Physic*. His almanack was ridiculed by Swift.

Partridge. Two Ps. are common in Britain, but it is usually the grey P. (*Perdix cinerea*) that is associated with the name. The other is the Fr. or red-legged P. (*Caccabis rufa*), which was introduced into Britain towards the end of the eighteenth century by the marquis of Hertford. Its sides and flanks are transversely barred, and its flight is more rapid than that of the grey P. In this species the plumage is mainly brown; the breast is bluish-grey, flecked with brown, and with a horseshoe patch of chestnut on a white ground on the lower breast. The sides are barred with chestnut. The wings are rounded and short. Ps. pair very early in the year, the males, like the males of most gallinaceous species, being very pugnacious. The nest is made with a minimum of trouble on the ground in fields or hedgerows, and contains from ten to sixteen pale greenish-yellow eggs. The hen hatches them, but the male is attentive to her during incubation. The young are fed chiefly on ant. pupae, and other insects when these are not available; these and snails and slugs form a considerable proportion of the food of older birds, but in addition grain and other seeds are consumed in great quantity when obtainable. The young remain with their parents for some months, forming coveys of about twenty birds. In the morning and evening they search the stubble and pastures for food, but during the day they hide in turnip fields, under hedgerows, or wherever else safe cover may be found. See B. Vesey-Fitzgerald, *British Game*, 1948.

Partridge Wood, or Cabbage Wood, is derived from a leguminous evergreen tree, native of S. America.

Parts of Speech, in grammar, are usually

reckoned as being eight in number. This number was fixed by the Gks., and though the classification has been changed since their time, the number has remained permanent. Aristotle, in his philosophical works, speaks of three parts of speech, nouns (*ονοματα*), predicates (*προματα*), and connectives (*συνδεσμοι*). The later Gk. writers fixed the parts of speech as follows: noun, verb, participle, article, pronoun, preposition, adverb, conjunction. The adjective was included under the noun, and here also came certain pronouns and numerals. When the Romans took over this system of classification an alteration was necessary, for the Lat. language contained no article. For this class the interjection was substituted. The Romans also abolished the participle class, but kept the number at eight by giving the adjective a class by itself. The Roman classification is that now generally adopted. It must not be supposed, however, that either of these arrangements is entirely satisfactory. They are both somewhat arbitrary, and the boundaries that separate one class from the other are very narrow. Words are now almost invariably assigned to their class according to the function that they perform, and this simplifies matters when once a satisfactory definition of each part of speech has been obtained. According to this method a large number of words can each serve at different times as different P. of S. The use of words as nouns which are really adjectives is very common, while the participle, though formally a verb, is more frequently used as an adjective than as a verb. Similarly the verbal noun partakes of the nature of a noun. Adjectives and adverbs have always been more or less interchangeable. The interjection has no function in the sentence, and so should not, strictly speaking, be included in the list. It is the conventionalised form of those early and semi-articulate sounds with which primitive man eked out his gesture language. The other parts of speech were all primarily derived from the verb and the noun. See GRAMMAR, and articles on each of the separate P. of S.

Party and Party Government (Party System). Government by party in one form or another exists in most civilised countries of to-day, and indeed the permanent existence of political parties may be regarded as a corollary of any democracy where the electorate is necessarily large.

The Eng. dual party system was evolved from the historical accident of the div. into Whigs and Tories in the Stuart period, a div. which, long after its causes had been forgotten, had become stereotyped into a tradition that it corresponded to a real divergence of political outlook—the Tories being the representatives of monarchy, Anglicanism, and insularism, the Whigs the aristocratic party of foreign adventure and expansion. By the mid-nineteenth century, however, the two great parties had approached so near to each other that, in Gladstone's words, the only distinction was that one 'was rather more

stationary, the other more movable.' His own great contribution was to convert the old Whigs into the Liberal party, which held the gov. of England in alternation with that Conservative party which was largely Disraeli's refashioning of the old Tories. The salient and remarkable fact about Eng. party government is that in all its implications it is a flat contradiction of the constitutional theory of government by kings, lords, and commons, however much in harmony it may be with the conventions of the *de facto* constitution. In the earliest decades of the twentieth century, whatever the distribution of private wealth and influence among the leading politicians, the Liberal party appeared to be definitely pledged to schemes of social reform and retrenchment, while the Conservative party seemed to be bent on the preservation of vested interests and some scheme of tariff reform. At the present time there are two political parties of numerical consequence in England, the Labour party having now replaced the Liberal party as the natural opponents of the Conservatives. A detailed statement of the growth and policy of the Labour party will be found under LABOUR PARTY, and it will suffice to say here that it is definitely opposed both to Conservatives and Liberals and to the small, if vociferous, Communist party.

The struggle between Commons and Crown was theoretically decided in 1688, and despite the activities of George III. and the personal influence of Victoria, the chief development of the eighteenth and nineteenth centuries was the evolution of Cabinet government based upon coherent and disciplined party majorities.

The Eng. party system is eminently favoured by the fact that the ministry of the day has gradually succeeded in drawing virtually the whole of the legislative as well as the executive power into its own hands. It differs from the group systems of party government in vogue before the Second World War on the Continent in that in the latter there were always, or nearly always, present in the legislative assembly one or more groups of 'irreconcilables,' whose immediate object was to change the existing form of government, sometimes by peaceful, sometimes by violent, means, in the same manner as the Communist party, whilst participating in the Eng. parl. system, ultimately seeks a totalitarian rule.

In more recent times there has been an increasing tendency to refer to royal commissions of experts outside the House of Commons questions which require ability not to be found among statesmen. Also, in times of grave crisis party government has been abandoned in favour of coalition. See PARLIAMENT: POLITICAL PARTIES; REPRESENTATION. See A. L. Lowell, *Governments and Parties in Continental Europe*, 1896, and *The Government of England*, 1908; J. Bryce, *Modern Democracies*, 1921; F. W. Maitland, *The Constitutional History of England*, 1926; W. Jennings, *Parliament*, 1938; H. R. G.

Groaves, *The British Constitution*, 1938; H. J. Laski, *Parliamentary Government in England*, 1938; E. Jenks, *The Ship of State*, 1939; D. Lindsay, *The Modern Democratic State*, 1943; C. Ilolls, *Can Parliament Survive?*, 1949; F. Williams, *Fifty Years' March* (the rise of the Labour party), 1949; and L. B. Namier, *History of the Tory Party*, 1949.

United States.—Here the party system has evolved some distinctive features. Beyond influencing public opinion, directing governmental policy, and winning elections, which are common indeed to all party systems, the Amer. party organisations direct two most important measures: they select candidates for office and procure positions for party workers. The same system of party patronage existed in eighteenth-century England, ultimately dying out to be replaced by a politically neutral civil service.

It was during the discussions over the adoption of the Federal Constitution by the various states (1787-91) that the first two parties were formed. The first, which took the name of Republican, and was led by Thomas Jefferson, maintained the independence of individual states in the matters of legislation, administration, and jurisdiction. The other under the name of Federalist was led by Alexander Hamilton, and maintained the supremacy of the central Federal authority and the subordination to it of the various states. In 1830 the Republican party came to be known as the Democratic party. The Federalist party declined in influence and disappeared between 1820 and 1830, but in its place a new party was formed under the name of Whigs. About 1854 the Whig party came to grief by reason of dissensions over the slavery question. Two years later a new party was formed, mainly from the old Whig party and supporting most of that party's traditions, under the name of Republican. Since that time the Democratic and Republican parties have represented the majority of the people of the U.S.A. There have of course been many smaller parties, some temporary to remedy some temporary grievance and some permanent, the chief among the latter being the Socialist organisations.

The Democratic party was the first to form anything like the elaborate machinery of the present day, about the time of President Andrew Jackson. They were followed in this by the Republican party when it was formed from the ruins of the Whig party. The machinery of an Amer. party consists of two bodies, one permanent, one temporary. The first consists of a system of committees, one for each important election area; these committees are subdivided in such a fashion that there is a state committee, a co. committee, a congressional dist. committee, and in some dists. a township committee; at the head of all these is the national committee. Each committee is locally independent, and is concerned with the management of party affairs, the organisation of meetings, the admission of voters, and the superintendence of the poll. The

other branch of the organisation consists of the bodies which nominate party candidates for elective posts. These bodies are meetings of members of the party in each election area. Every four years in the summer preceding the presidential elections, a national convention is assembled consisting of delegates from state conventions, each state sending two members to every federal representative it possesses. After the appointment of a chairman and the formation of a series of committees, a number of resolutions are discussed and adopted. These resolutions form the party 'platform.' The aspirants for the presidential post are then balloted on. The roll of the states is then called alphabetically, and the chairman of each state delegation announces the vote of the state. In Democratic conventions a state delegation, if instructed by the state convention to cast its whole vote for a particular aspirant, must do so; in other conventions this unit rule is not in force. If on the first roll-call one candidate obtains an absolute majority (in Democratic conventions two-thirds majority), the choice is then declared nominated. If no candidate polls the requisite number of votes, the poll is repeated until this is achieved. The candidate for vice-president is then chosen.

It would be very misleading to identify the Democratic with the Brit. Liberal party and the Republican with the Brit. Conservative party. Though generalisations are dangerous, it may be said that on the whole the Republican party is the party which tends to uphold the Federal power and to increase it, while the Democratic party is the party which is pledged to uphold unimpaired the rights of the separate states. Yet notwithstanding this tradition, Roosevelt's Democratic administration probably interfered with states' rights more than any other in the hist. of America. It is to be noted that as yet there is no Labour party, though there are two powerful and rival labour organisations, the Amer. Federation of Labour and the Congress of Industrial Organisations, and these have never, as happened in Britain, formed a separate political party or put up candidates for Congress. The only place in America where there has ever been a Labour political party is New York, where there has consistently been a Socialist candidate for presidency, and Socialist or Labour candidates for various political offices for many years. Trade unionists and the groups who would in Britain support a Labour party follow a different course; their leaders bargain with the Republican and Democratic candidates and the rival machines, and carry the Labour vote to the side which is ready to offer most support to the claims of organised Labour. Hence though no Socialist candidate has as yet succeeded in obtaining more than a small protest vote, no president can ever be elected if the whole, or a large section, of Labour support goes to his adversary. Again it must not be supposed that the Republicans are the Right and the Democrats the

Left. There are in the Democratic party as hide-bound Tories as any in the world, and in the Republican some of the boldest advocates of social economic experiment. The largest single block of opinion in the Democratic party consists of the reactionary Tory majority in the heavily Democratic S. states. Apart from the Democrats of the S., there are the powerful city Democratic party organisations (of varying integrity), of which Tammany Hall in New York is the best known. Apart from these elements, the Democratic party consists of a large proportion of organised Labour, and of rather more than half Amer.-educated Progressives. It is, at least in the E., the party of all who oppose Wall Street. In the country small farmers normally vote Republican, but they may sometimes be swung *en masse* into the Democratic group. As for the Republicans, they are at the same time the party of big business and finance, especially in New York and Chicago and the other great cities, the party of New England Conservatism, the party of the Middle W. farmers, and the party which represents in various ways the reaction of the W. to the 'money empire' of the E. See C. E. Merriam, *The American Party System: an Introduction to the Study of Political Parties in the United States*, 1940.

'Single-party Government.'—The antithesis to the party system as understood in England or the U.S.A. or any of the Brit. dominions, or to the group system of France, etc., is the single-party form of government of Fascist, Communist, or 'authoritarian' regimes. 'Single-party government' is a misnomer or even a contradiction in terms, for a coherent party system implies the existence and political influence of more than one party. The essential feature of any Fascist or authoritarian system is that it is 'nationalist' in character and intolerant of any political opposition. See further under FASCISM and NATIONAL SOCIALISM; also RUSSIA.

Paruta, Paolo (1540-98), Venetian historian, pub. *Della Perfezione della vita politica* in 1579, and was appointed official historian to the republic. He also wrote a number of political orations, *History of the War of Cyprus*, and *History of Venice from 1513 to 1551*, pub. after his death. See ed. by Apostolo Zeno, 1718.

Pārvatī, see UMA.

Pasadena, city of California, in Los Angeles co., 10 m. N.N.E. of Los Angeles. It is near the base of the Sierra Madre, has an altitude of from 750 to 1000 ft., and has sev. mt. peaks in the immediate vicinity ranging from 3200 to 6000 ft., with two observatories. Its fine climate and picturesque surroundings make it a famous winter health resort, its vicinity to Los Angeles making it a favourite residence of cinema artists. Fruits and flowers and sub-tropical trees and plants grow and bl. in all the year round. P. grows fruit for export, particularly oranges and lemons. Cork-oak grows, also eucalyptus, and pepper-growing is an important industry. P. manufactures furniture and has machine shops. The California

Institute of Technology is at P., which also has a Natural Hist. Museum and an Opera House. Pop. 31,900.

Pasargadæ, anc. city of Persia, founded by Cyrus the Great, was for a time the cap. of the country, being superseded by Persepolis. It was situated near the R. Polvar, about 55 m. N.E. of Shiraz, and was inhabited by the Pasargadians. The prin. ruins, including the tomb of Cyrus, are situated near the present tn. of Murghat.

Pascagoula, riv. of U.S.A., in the S.E. portion of Mississippi. It flows for a course of about 250 m. into a small bay of the same name, on the gulf of Mexico, and is navigable for about 100 m.

Pascal, Blaise (1623-62), Fr. mathematician and devotional author, b. of a good family of lawyers at Clermont-Ferrand. As a mathematician, his youthful

achievements of discovering by himself *Euclid*, Book I, up to Proposition 32, at the age of twelve, and of writing a book on conic sections which gained the approval of Descartes, and which is the foundation of the modern treatment of the subject, at the age of sixteen, gave promise of extraordinary ability. This promise was amply fulfilled; by following up the experiments of Torricelli, he succeeded in determining the weight of air, and from this he arrived at the means of measuring altitude by reading barometric pressure; he invented the hydrostatic press, and also his calculating machine; and in pure mathematics he investigated the theory of probability and the differential calculus. P. embraced a monastic life in 1654, and came under Jansenist influence at Port Royal. In the same year P. enjoyed the famous mystical experience referred to in the *Memorial*. The following year Antoine Arnauld, the virtual chief of the circle, being threatened with censure by the Sorbonne for his teaching on efficacious grace, called upon P. to defend him. The result was his celebrated *Lettres provinciales* (1656-57), regarded by Voltaire as 'witty as Molière and sublime as Bossuet.' The following year his health broke down, and he died four years later. His *Pensées sur la religion* were pub. in 1669; they were ostensibly the jottings for a projected *Apologia*. P. recognised that Christianity is a bond between the greatest and the most degraded, as symbolised particularly at the Crucifixion; he refuted the sceptic and modified the Stoic position accordingly, in his own brilliant style. This may account for the dictum that 'he juggled with God and with the immortality of the soul'; and this in turn for his condemnation by some critics (e.g. Cousin) as a pessimist. Nietzsche called P. 'the one logical Christian.' The Eulogium of P. by Bordas-Demoulin, which won the prize of the Fr. Academy on June 30, 1842, is to be found in many eds. of the *Lettres*. The best eds. of the *Pensées* are those of Antoine Nicolas, Marquis de Condorcet, 1776; J. de Bossut, 1779; A. Molinier, 1877; and G. Michand, 1896. There is a trans. by W. F. Trotter in Everyman's Library. Fagère's ed. of the *Lettres provinciales* is the most reliable. P.'s complete works were ed. by L. Brunschwig and E. Boutroux in 1908. *See* L. Brunschwig, *La Genie de Pascal*, 1924; C. J. Webb, *Pascal's Philosophy of Religion*, 1929; M. Bishop, *Pascal*, 1938; H. F. Stewart, *The Secret of Pascal*, 1941; and D. Patrick, *Pascal and Kierkegaard*, 1918.

Pascal, Jean Louis (1837-1920), Fr. architect, b. in Paris. He obtained the Grand Prix de Rome, 1866, and planned restorations (churches and palaces) in Italy. Returning to France, he took part in many important designs, and in 1875 became architect of the Bibliothèque Nationale, of which he lived to see the completion.

Paschal, name of two popes and one antipope: 1. *Paschal I.* (817-24), a Rom., notable chiefly for his relations with the Emperors Louis and Lothair, the latter of whom he crowned in 823. In his pontificate the iconoclastic controversy began. He was canonised. 2. *Paschal II.*, known also as *Rainerius* (1099-1118), reigned while the question of investiture was being disputed, and thus came into conflict with Henry I. of England among others. 3. *Paschal III.* (Guido of Crema), antipope, was set up in 1164 by Frederick Barbarossa, and continued the opposition to Alexander III. At the instigation of Frederick he canonised Charlemagne.

Paschal Lamb, *see* PASSEVER.

Pasco, Cerro de, *see* CERRO DE PASCO.

Pascoli, Giovanni (1855-1912), It. poet and scholar, b. at San Marco di Romagna, Forlì; lecturer at Bologna Univ., succeeding G. Carducci in the chair of It. literature, 1905. He was earlier prof. of Gk. and Lat. grammar at Modena and Pisa Univs. Among his poems are *Myrica* (1891); *Primi Poemetti* (1897); *Canti di Castelvecchio* (1903); *Poemi conviviali* (one of his best works, 1904); *Odi et Inni* (1906); *Poemi italiani* and *Inno a Torino* (1911). He also wrote poems in Lat. Noble philosophic reflections and social



BLAISE PASCAL

achievements of discovering by himself *Euclid*, Book I, up to Proposition 32, at the age of twelve, and of writing a book on conic sections which gained the approval of Descartes, and which is the foundation of the modern treatment of the subject, at the age of sixteen, gave promise of extraordinary ability. This promise was amply fulfilled; by following up the experiments of Torricelli, he succeeded in determining the weight of air, and from this he arrived at the means of measuring altitude by reading barometric pressure; he invented the hydrostatic press, and also his calculating machine; and in pure mathematics he investigated the theory of probability and the differential calculus. P. embraced a monastic life in 1654, and came under Jansenist influence at Port Royal. In the same year P. enjoyed the famous mystical experience referred to in the *Memorial*. The following year Antoine Arnauld, the virtual chief of the circle, being threatened with censure by the Sorbonne for his teaching on efficacious grace, called upon P. to defend him. The result was his celebrated *Lettres provinciales* (1656-57), regarded by Voltaire as 'witty as Molière and sublime as Bossuet.'

dreams, perhaps somewhat Utopian, are revealed in these. He also wrote two interesting works on Dante, *Minerva oscura* (1898) and *Soito il relame* (1900). A complete ed. of his works was pub. 1935 ft. See studies by B. Croce, 1920; A. Gandiglio, 1924; and F. Montanari, 1914.

Pas-de-Calais: 1. or Strait of Dover (see DOVER). 2. Dept. of N. France, formed in 1796 from most of Artois and the N. maritime portion of Picardy; bounded on the W. by the Strait of Dover and the Eng. Channel. It covers an area of 2606 sq. m. The surface is generally flat, and the soil fertile and watered by sev. rivs. The seaboard is about 80 m. long, and consists chiefly of dunes. The climate is damp and changeable. The prin. crops are cereals, potatoes, sugar-beet, and tobacco. Coal is produced, the chief coal-basin centring on Bethune. Calais and Boulogne are the most important ports of transit. There are iron and glass works, tanneries, potteries, etc., and fishing is an important industry. *Cap. Arras.* There are five arrons.: Arras, Bethune, Boulogne, Montreuil, and St. Omer. In 1914 Ger. flying-bomb sites were constructed in the dept., drawing heavy Allied bombing attacks. The dept. was liberated on Sept. 1 and 2 of that year, with the exception of Calais, where the Gers. held out until the end of the month. Arras, Bethune, and other places were much damaged, Boulogne especially so, and the old tn. at Calais was largely destroyed. Pop. 1,168,500.

Paseng, see GOVT.

Pasha, Pacha, or **Bashaw**, title derived from the Persian, and applied to commanders of high rank, naval, military, or civil, in the Turkish Empire. At one time it was limited to princes of the blood. Every general or governor of a prov. was *ex officio* a P.

Pasht, see under BERARIS.

Pasig: 1. Riv. of Luzon, Philippine Is. It flows W. from the N. end of the Laguna Bay, emptying into Manila Bay at Manila. 2. Cap. of Rizal prov., Luzon, Philippine Is., at entrance of the Marikina R., 9 m. E. of Manila. Pop. 12,000.

Pasiphaë, mother of the Minotaur (q.v.).

Paso del Norte, El, see CIUDAD JUÁREZ.

Passue Flower (*Lancone pulsatilla*), beautiful Brit. plant bearing purple flowers which are so called from appearing about Easter time. It is a good rockery plant, but prefers a dry, chalky soil.

Pasquier, Étienne (1529-1615), celebrated Fr. advocate and writer, b. in Paris. Early destined by his parents to follow the career of an advocate, he studied law at the Bologna Univ. under Socin, and was admitted to the Bar in 1549. During his earlier days he indulged his literary tastes by publishing *Recherches sur la France* (in encyclopædia form) (1560); *Monophile* (dissertations on love) (1558); and *Pour-parler du prince* (c. 1560). The first named led to his obtaining in the *Parlement* in 1564 a brief for the univ. of Paris, the lawsuit arising out of the Jesuits' attempt to gain admission to that univ. Thenceforth he appeared in numerous *causes célèbres*. In 1588 he became deputy in

the States-General (q.v.). In 1603 he resigned his office of advocate to the king, and devoted the rest of his life to literature. The collected works of P. were pub. in 1723. See life by Margaret J. Moore, 1934.

Pasquin, or Pasquino, name of a cobbler of Rome, celebrated for the gibes he hurled at every turn. He lived at the corner of the Palazzo Orsini, and at his death the mutilated statue of a gladiator, which was found under the pavement near his stall, was put up on the same spot and received the name P. It became customary to affix to this statue satirical verses directed against prominent personages, which were hence called *pasquinades*. The satires were for the most part epigrammatic replies to some topical question affixed on the pediment of a statue of Marforio, which stood near by. A celebrated instance is the following:

Marforio. E vero, Pasquino, che tutti Francesi sono ladri?

Pasquino. Tutti, no, ina buona parte.

('Is it true, Pasquin, that all Frenchmen are thieves?')

'All! no, but the greater part of them.'—

directed against and being a pun upon the name of Napoleon Bonaparte, on the occasion of the Fr. occupation of Rome.

Passacaglia (Sp. *pasar*, walk, and *calle*, street), originally an It. or Sp. dance, but now an instrumental composition based on a ground, i.e. a tune continuing throughout, usually, but not necessarily, in the bass, as it always does in the Chaconne. The best-known example actually called P. is Bach's for organ; the finale of Vaughan-Williams's Fifth Symphony is also a familiar P.

Passage, Court of, anct. existing civil court of record in the bor. of Liverpool. Formerly the mayor acted as presiding judge, assisted by bailiffs of the bor.; but by the Court of Passage Act, 1834, a qualified legal assessor was added to the bench, and four years later the mayor and bailiffs were dispensed with altogether. Finally an Act of 1893 made the assessor the sole presiding judge, with powers not inferior to those of a high court judge. Generally speaking only those actions can be tried in this court where the defendant at the time the action was launched resided or carried on business within the jurisdiction, or, by leave of the judge or registrar, where the whole or part of the cause of action arose within the jurisdiction.

Passage Island, see CULFRA.

Passaic: 1. City of New Jersey, U.S.A., 13 m. N.W. of New York. The E. part consists chiefly of a plain, whilst the W. is more hilly and almost entirely residential. The chief buildings of interest are the city hall, general hospital, general public library, and the J. H. Watson Reid Memorial Library. The prin. manufs. are rubber goods, metal wares, silk, cottons, and worsted. Pop. 61,400. 2. Riv. of New Jersey, U.S.A., rising in Morris co., and flowing between Union and Essex cos. for a course of about 100 m. into Newark Bay. The falls at Paterson supply

abundant water-power for the tns. of Newark, Paterson, and P.

Passamaquoddies, tribe of N. Amer. Indians of Algonquin stock, allied to the Penobscots. The remnant of them reside on the W. shore of Passamaquoddy Bay, in the state of Maine, and number about 350; they have a considerable admixture of Fr. and Eng. blood.

Passamaquoddy Bay, an inlet of the Atlantic between Maine, U.S.A., and New Brunswick, Canada. It is 15 m. in length and about 10 m. in breadth, deep, sheltered, and never blocked by ice.

Passaro, Cape, Battle of, battle fought between the Eng. and Sp. in 1718. The latter had captured the Is. of Sicily, and were besieging Messina. The Brit. fleet, under George Byng, Viscount Torrington, raised the siege and compelled the Spaniards to withdraw from Sicily. In the battle twenty-five ships out of the Sp. fleet of forty-five were taken or destroyed, and the Sp. admiral, Castaneta, was captured. For this service Byng was created Baron Byng of Southill and Viscount Torrington, and was given full power to negotiate with the princes and states of Italy.

Passarowitz, see POZAREVAC.

Passau, tn. and episcopal see in Bavaria, Germany, near the Austrian frontier, and 90 m. N.E. of Munich. It has four suburbs, viz. Innstadt, Ilzstadt, Auger, and St Nikola, and is one of the most picturesque situated tns. on the Danube. It possesses eleven churches, the chief of which is the cathedral of St. Stephen. In the fine Dom Platz is a statue, erected in 1824, of the Bavarian king, Maximilian I. There is a univ. It is noted for manufs. of tobacco, beer, leather, porcelain, machinery, and paper. Pop. 26,000. See F. Mader, *Passau*, 1925.

Passchendaele, tn. in Flanders, near Ypres. The tn. and P. ridge, the high ground in front of Ypres, were the scene of bitter fighting in the third battle of Ypres on Oct. 12 and Oct. 26 to Nov. 10, 1917. The ridge was the immediate objective of the allies' offensive from Ypres after the Messines-Wytschaete ridge had been taken by the Brit. troops of Eng. and Irish and dominion units. The Ger. defences were strengthened with 'pill-boxes' or concrete redoubts bristling with machine guns, and, being level with the ground, difficult to reduce by artillery fire and fatal to attacking infantry. The Brit. forces, after heavy losses, entered P. itself on Oct. 30, but were driven out again almost immediately. The Canadians retook the tn. on Nov. 6, and held their positions in face of desperate Ger. counter-attacks, and throughout the next days the allies successfully cleared the sides of the ridge, the name of which will not be lightly forgotten by those who fought for it; its surrender in the battle of Ploardy (or the Lys) in April of 1918 was a sore blow to Brit. pride. The tn. was eventually recaptured at the end of Sept. 1918. Eng. military critics have severely criticised the Fr. and Brit. high commands for the whole conception and strategy of this costly and tragic battle of the days of static trench warfare.

Passenger Pigeon (*Ectopistes* (or *Columba*) *magratoria*), N. Amer. bird whose sudden and complete disappearance is the most remarkable in zoological hist. It was probably the most gregarious bird in existence, and during its breeding season used to occupy a crowded area of over 100 sq. m. On account of its value as a table delicacy it was ruthlessly persecuted, and in one year 15,000,000 dead birds were dispatched from Michigan and Pennsylvania. In 1888 it failed to take up its usual breeding quarters, and then disappeared without trace, the last known specimen dying in 1914 at Cincinnati zoological gardens. Its main features were its long wings and longer narrow tail.

Passeriformes, order of perching or passerine birds, characterised especially by the four-toed foot, the claw of the hind toe, which is separately controlled, being larger than that of any of the other toes. This is by far the largest order of birds and indeed comprises more than half the number of known birds. Only among its numbers is the power of song much developed. There is, however, a section of the order which includes a number of songless birds, none of which are found in Europe.

Passfield, Sidney James Webb, Baron (1859-1947), Eng. socialist, historian, and statesman; b. in London, son of Charles Webb. He was educated at private schools in London and spent some years in Switzerland and Germany, completing his education at the City of London College, Birkbeck College, and King's College. He was a clerk in a colonial broker's office in London, 1876-78; by open competition he reached the status of lower div. clerk in the War Office, 1878-79; he was surveyor of taxes, 1879-81; colonial office clerk, 1881-91. In 1885 he was called to the Bar, and gained the LL.B. of London Univ. He was member for Deptford on the L.C.C., 1892-1910. Prof. of public administration, London School of Economics, 1912-27; and one of the senate of London Univ., 1900-9; he served on the Royal Commission on Trade Union Law, 1903-6; the Coal Industries Commission, 1910; the Royal Commission under Development Act, 1910-22; and many important committees. Labour M.P. for the Seaham div. of Durham co. 1922-29, he was P.C. in 1924, being president of the Board of Trade from Jan. to Nov. of that year. In 1929 he was ennobled and became secretary of state for the colonies and dominion affairs (from 1930 to 1931 for colonies only). His greatest achievement is the placing of the Brit. socialist movement in its historical setting by the books he wrote in collaboration with his wife, Beatrice Webb (q.v.). Although he held Cabinet rank in two Labour Govs. he was never a prominent figure in public life, and when he entered the House of Commons in 1922 his career had begun to draw towards its close. It was indeed with reluctance that he accepted the office of president of the board of trade in 1924, and he had already contemplated retirement when, as a peer, he once more assumed office in the dominions and

colonial offices. Yet in practical achievement he accomplished more than most politicians of his day as in the development of social and political reform. Through the Fabian Society, of which he was one of the pioneers (see under **FABIAN SOCIETY**), he played the most conspicuous part in converting Brit. Socialism from a propaganda of social revolution to a programme for the working-class movement, and more than any other led the Labour party to accept the Fabian interpretation of Socialism. But his greatest interest was education, and, having become chairman of the Technical Education Board, he strove to bring secondary and univ. education within reach of the working classes (he lectured in political economy at the City of London College and Working Men's College); and he was so far successful that the subsequent revolution in educational administration, the transfer of control to local authorities, the development of secondary education, and the enlargement of the univ. system were all for the most part due to his efforts. The Fabian programme, much of which the Education Act of 1902 embodied, was also his work. He was entitled to particular credit for his share in the creation of the Imperial College of Science and Technology, and the development of a unified library system in London.

The Webbs formed a partnership unique in the public life of their generation, and one to which the Socialist movement must be ever grateful. One of their striking achievements was a visit to Russia in 1932 and 1934, which resulted in *Soviet Communism: a New Civilisation?* (1935), which work, however, proved the least acceptable of the Webbs' writings, critics condemning its too ready acceptance of gov. statistics and its failure sufficiently to consider the loss of individual liberty in the Soviet system. This, however, in no way lessens the magnitude and importance of the work, both in affairs and in writing, which this long partnership performed. The ashes of Lord and Lady P. (d. 1913) were interred in Westminster Abbey in Dec. 1947. The great mass of pub. by Lord P. include, with his wife, *History of Trade Unionism* (1894, revised 1920); *Industrial Democracy* (1897); and a series of vols. on the hist. of local government (*English Local Government*, 1908-22); also his *Socialism in England* (1890); *A Constitution for the Socialist Commonwealth of Great Britain* (1920); *English Poor Law History* (1927-29); and *Soviet Communism* (1935). See the autobiographies of Lady P., *My Apprenticeship* (1926) and *Our Partnership* (1918); also Margaret Cole (ed.), *The Webbs and their Work*, 1919.

Passfield, Lady, see WEBB, BEATRICE.

Passion Flower (*Passiflora*), genus of climbing herbs and shrubs, many of which bear flowers of a form which led devout settlers in S. America to give the plants their name. The three stigmas were seen to represent nails, one transfixing each hand, and one the feet, of the crucified Christ; the rays of the corona, the crown of thorns; the five anthers, the wounds;

the ten parts of the perianth, the ten faithful apostles; and the digitate leaves and tendrils, the hands and scourges of those who scourged Him. *P. carulea* is hardy in warm, sheltered gardens, but the other species require culture under glass.

Passionists. 'The Congregation of Discalced Clerks of the Most Holy Cross and Passion of our Lord Jesus Christ' was founded by St. Paul of the Cross about 1730, its rule being approved in 1741 by Benedict XIV. They are engaged in revival and mission work in various parts of the world. The P. were introduced into England in 1841.

Passion Music. From the earliest days of the Christian Church it has been the custom to read the hist. of the Passion of Christ during Holy Week, but it is impossible to say at what date the hist. began to be solemnly chanted, though it was certainly before the eighth century. In the Rom. Church the Passion gospels are sung in plain chant by three ministers in three different tones, one taking the words of our Lord, another the words of the evangelist, and a third those of other characters. The people (*turba*) are, when possible, represented by the choir for whom magnificent polyphonic music was written by Palestrina and Victoria.

Passion Play, drama in the form of the old miracle plays depicting the Passion of our Lord. P. Ps. are found during the later Middle Ages, especially in Germany and the Tyrol, and they reached the height of their excellence during the sixteenth century. The best-known modern example is the Oberammergau P. P., first mentioned in 1633 in connection with a vow made by the peasants, after a severe visitation of the plague, that they would perform a passion drama once in every ten years. The text of the Oberammergau play has sev. times undergone revision. See F. W. Farrar, *Passion Play at Oberammergau*, 1890.

Passion Week, week preceding Holy Week (q.v.).

Passive Resistance. This term, which figured largely in the newspapers shortly after the passing of the Education Act, 1902, was the name given to the movement, whether organised or not, for the refusal to pay the new education rate. By this Act voluntary elementary schools became rate-aided for the first time in the hist. of the great education controversy, and the rate in aid, which was levied as part of the co., bor., or dist. rate (as the case might be), was vehemently objected to by nonconformist (mainly) ratepayers, on the ground that by compelling them to maintain church schools the legislature was guilty of endowing a particular religious denomination and one with which they had no sympathy. In India, between the two world wars, Gandhi (q.v.) embarked upon a campaign of opposition to what he conceived to be Brit. injustice and oppression, which was characterised by professionally non-violent tactics known as 'P.R.', as well as 'civil disobedience' and 'non-co-operation'. In industrial disputes the principle of P. R. is exemplified in dilatory tactics, variously known as

'going slow,' 'ca' canny,' and 'working to rule.'

Passivity, state induced in certain metals whereby they become insoluble in dilute acids. P. is caused by dipping the metal (e.g. iron, chromium) in concentrated nitric acid. It can be removed by rubbing with sandpaper, etc.

Passmore Edwards, see EDWARDS, JOHN PASSMORE.

Passmorean, see PASSURUAN.

Passos, John (Roderigo) dos (b. 1896), Amer. novelist, b. in Chicago, Illinois, graduated at Harvard Univ. in 1918. After leaving the univ. he travelled in Spain in order to study architecture. However, he shortly joined the Fr. Ambulance Service in the First World War, and later the U.S. Medical Corps. When the war was over he took to writing and his first book, *One Man's Initiation—1917*, appeared in 1920. In 1922 appeared a vol. of verse, *A Push Cart at the Curb*, and a vol. of essays, *Rosinante to the Road Again*. In 1923 he pub. a novel, *Streets of Night*, a typical story of the struggle of a sensitive and artistic young man with his philistine environment. His preoccupation with the social environment led him to plan and write his great trilogy of Amer. life, *42nd Parallel* (1930), *1919* (1932), *The Big Money* (1936). It was the culmination of his thinking and writing on the contemporary scene. The trilogy deals with Amer. life over a wide canvas, exposing the social evils of a corrupt and decaying commercial civilisation built upon a system of exploitation and greed. He uses a number of unusual technical devices e.g. he brings in news-reel and newspaper headlines, snatches of contemporary songs and adverts, as well as using a 'stream of consciousness' technique for the purposes of author's comment. In 1939 he pub. *Adventures of a Young Man* (a novel) and *The Ground we Stand On* in 1941. His book, *The Grand Design*, was pub. in 1919.

Passover (Heb. *pesah*), first of the three great festivals commanded to be observed in the Pentateuchal codes. According to Exodus xii. it was instituted to commemorate the exodus from Egypt, in particular the 'passing over' of the houses of the Israelites (distinguished by the sprinkled blood on the door-posts) by the angel of the Lord when the first-born of the Egyptians were slain. The order of its celebration was to be thus: A lamb or kid, a male of the first year, without blemish, was selected by each household (or, if the households were small, by two conjointly on the tenth day of the month Abib (Nisan), and it was kept till the fourteenth day of the month, when it was killed in the evening and roasted and eaten with unleavened bread and bitter herbs. . . . for thou canstest forth out of the land of Egypt in haste. . . . (Deut. xvi. 2). They were, therefore, to eat it in haste, standing, with their loins girded, their shoes on their feet, and their staves in their hands, as those prepared for a journey. None, whether Israelites or strangers, were to partake of it unless they had been circumcised. During the

seven days for which the feast lasted none but unleavened bread, called *Massoth*, was to be eaten, on penalty of being cut off from the people, and special sacrifices were appointed for each of these days. The first and the last of those seven days were considered as full feasts and 'no manner of work shall be done in them, save that which every man must eat' (Exod. xii. 16). Outside Palestine the P. lasts eight days (or rather, nine days, because on the P. eve no leavened bread may be eaten after breakfast), of which the first two and the last two are full feasts. On the other hand, as in all Jewish festivities, the evening of the last day is not considered as festal. Critical study of the biblical accounts of the P. make it arguable that it is to be regarded as the result of the union of two festivals, one of which was a pastoral feast for the offering of the first-born of the flocks in order to secure prosperity for the rest; the other was an agric. feast which the Hebs. adopted after their settlement in the land of Canaan.

Passport, warrant of protection and authority to travel. Where such document is necessary it is generally granted to the bearer by a consul or some other competent authority of the bearer's own country, and signed by the proper authority of the state to which he intends to proceed. It is necessary for Brit. subjects travelling abroad to do so under the protection of the Brit. Gov., and for that purpose a P. may be obtained from the P. Dept. of the Foreign Office and through local officers of the Ministry of Labour at a cost of 15s., or through the post if a crossed postal order for the above amount is enclosed. The applicant for a P. must sign a declaration in a specified form, and also obtain the declaration of a member of Parliament, justice of the peace, barrister, solicitor, clergyman, doctor, bank officer, or senior public official to the effect that he is a fit and proper person to be entrusted with a P. He must also produce two photographs and other documents specified in the form of application. Members of the navy, army, or air force may have their declarations verified by their commanding officer. Foreign Office Ps. are granted to natural-born Brit. subjects, or to the wives or widows of such persons, or to persons naturalised in the United Kingdom, the Brit. dominions, colonies, India, or Burma (the wife of an alien (q.v.) is deemed to be an alien). Where the applicant is a person naturalised in the dominions, a letter of recommendation from the high commissioner or agent-general in London of the state concerned is required, while applicants naturalised or resident in the colonies must obtain a letter from the Colonial Office. Brit. Ps. are available only for travel to the countries named in the P., but may be endorsed for additional countries, subject to compliance with the immigration regulations for the time being in force in Brit. or foreign countries or with the necessity for obtaining any visa required. Foreign Ps. are available for five years from the

date of issue, and may be renewed for further consecutive periods up to five years, but in no case beyond ten years from the date of original issue. The P. Office is in Queen Anne's Gate Buildings, Westminster, London, with a branch office in Liverpool. Persons resident in N. Ireland apply to the branch P. office in Liverpool.

Passy: 1. W. suburb (sixteenth arron.) of Paris, annexed in 1860, between the Bois de Boulogne and the Seine. 2. Comm. of the dept. of Haute-Savoie, in the arron. of Bonneville. Pop. 4400.

Paste, form of adhesive usually made by mixing flour with water (about 2 lb. to the gallon). The water is added gradually and the whole well mixed. An ounce of alum is added to increase the adhesiveness, and the whole boiled and well stirred. Bookbinders usually add about an ounce and a half of resin instead of the alum, thus getting a thicker and still more tenacious P.

Pasteboard, see CARDBOARD.

Pastel, or Crayon, Drawing, name applied to a method of painting with dry pigments. It has been practised in England from an early date, and John Riley (1646-91) produced many works in P. But Francis Cotes (1725-70) was the first Englishman to develop the art fully, and his portraits of Mr. and Mrs. Joab Bates and Lord Hawke testify to his high ability. He was followed by John Russell, R.A. (1765-1806), who brought the art to perfection. But it was a favourite medium not only in England (especially for portraiture), but also on the Continent, such names as Rosalba Carriera, J. E. Liotard, and the great master Quentin de la Tour being conspicuous. In more modern times it has been practised by Degas, Millet, and Whistler.

Pasteur, Louis (1822-95), Fr. chemist and scientist, b. at Dôle (Jura). He was educated at Artois, Besançon, the École Normale, and the Sorbonne. B.-ès-L. 1840, and became a mathematical master; B.-ès-Sc. 1842. He studied chem. and physics, and worked specially in the branch of isomerism. In 1852 he was appointed prof. of chem. at Strasburg, where he married Mlle Laurent. His earlier work on the tartarates, when he showed to Birt the hemihedral crystals and their action on polarised light, and discovered the left-handed tartarates, was steadily continued by research in stereochem. In Strasburg his attention was turned seriously to fermentation, and he showed that *Penicillium glaucum* destroyed only the right-handed portion of the inactive tartaric acid. He was appointed prof. of chem. at Lille in 1854. In the breweries of this tn. he examined the 'diseases' of beer, wine, and vinegar, and discovered the micro-organism of ferment, thus killing the growing theory of 'spontaneous generation' by proving the presence of micro-organisms in the atmosphere and the healthiness of injured living matter when protected from them. These researches led to the revolution of surgical practice by Lister. Meanwhile his work on acetous, lactic, and vinous

fermentations was pub. (1876) in *Études sur la bière*, with enormous advantages to an important industry of his native country. This was not his only service directly to industry. In 1885 he carried out a masterly and classical research in the disease attacking the silkworm, discovering two bacterial kinds and combating them successfully. Following up Jenner's vaccine treatment, he studied chicken cholera, and reduced the mortality in fowls from 10 to less than 1 per cent. A similar result followed his work in anthrax. By discovering the bacillus, isolating and cultivating it, a degenerate weakened form was obtained, which, when inoculated, produced a slight attack of the disease, and rendered the subject



Hachette

LOUIS PASTEUR

immune. Huxley states that P.'s work in terms of money only was enough to cover the whole cost of the Fr. war indemnity of 1870. The method has occupied the labours of pathologists ever since, and each disease is at any rate being elucidated, while many have now yielded up their special micro-organism. Although unable to isolate the microbe of hydrophobia, P. nevertheless successfully located it in the nerve centres, and by inoculating fluid from the spinal cord of a diseased dog into a healthy animal, thus producing the disease, he obtained an attenuated strain whereby immunity could be secured, and extended the treatment to human beings with success. The P. Institute was founded, and others have been erected in many countries. P. died near St. Cloud and was buried in a tomb at his institute. Not only as an eminent pathologist did he gain the honours of the whole world, but his character gained affection and reverence from all. See also PASTEUR TREATMENT; PASTEURISATION.

See R. Valéry-Radot, *Vie de Pasteur*, 1900 (Eng. trans. 1901); also lives by his son-in-law, Bourmand, Duclaux, and Mr. and Mrs. Percy Frankland, 1898.

Pasteurisation, process employed to reduce the number of bacteria in a medium. Pasteur found that about 95 per cent. of the bacteria in milk could be killed by heating it for 20 min. at a temp. from 60° to 80° C. The milk must be rapidly cooled, otherwise bacterial spores become active and reinfection occurs. P. of milk under certain conditions is recognised by health authorities. Longer heating (30 min.) and rapid cooling are insisted upon so that bacteria causing tuberculosis may be killed.

Pasteur Treatment for procuring active immunity against anthrax, hydrophobia, and other virulent diseases, consists in the injection of a preparation containing the particular organisms causing the disease. These organisms have had their virulence reduced by growth under unfavourable conditions. When injected they stimulate the blood to produce antitoxins which remain for some time and protect it from the particular disease. If the first injection be followed after a suitable interval with one containing more virulent bacteria, the antitoxins, and hence the probability of immunity, will be increased. The principle is based on Jenner's treatment of small-pox by vaccination.

Pastiche, or *Pasticcio*, in literature or art, a patchwork of borrowings, or work in imitation of another's style. In music a stage entertainment for which the music was not written by a single composer, but put together from various earlier works by any number of composers who happened to be popular. The words were therefore written to the music, not the reverse, as in opera, &c. In eighteenth-century Italy, however, words as well as music, especially from Metastasio's works, were often taken over by a P. The P. was especially fashionable in the eighteenth century. The ballad opera and the vaudeville were both Ps. of a kind.

Pasto, city of Colombia, S. America, cap. of Nariño prov., on a flank of the P. volcano (14,000 ft.), 130 mi. N.E. of Quito. It is the seat of a bishop, and has a Univ. There are gold mines near. Pop. 61,000 (partly Indian).

Pastor Letters, correspondence of a Norfolk family of that name, together with state papers and other documents, covering the period from 1422 to 1509. They form an invaluable source of information as to fifteenth-century life and manners. Most of the collection was sold early in the eighteenth century by Wm. P., earl of Yarmouth, to Peter le Neve, and after changing hands sev. times came into the hands of Sir John Fenn, who ed. them in 5 vols. (1787-1823). The remainder was discovered in 1875. The best ed. is that of James Gairdner (6 vols.), 1904, and there is an abridgment in *Everyman's Library*.

Pastor, or Rose-coloured Starling (*Pastor roseus*), beautiful member of the starling family. The adult bird has a long

crest which, like the head, neck, and throat, is glossy violet-black; the back, shoulders, and under-surface are a delicate rose-pink, and the wings and tail greenish-black. It is common in India and occasionally visits Europe.

Pastoral Epistles, see BIBLE and TIMOTHY.

Pastorales, see BASQUES.

Pastoral Letter, letter addressed by the bishop of a diocese to the whole body of clergy and the people under his jurisdiction. Such letters are usually read out from the pulpit of each church.

Pastoral Poetry, poetry descriptive of country life, and includes pastoral drama, in which the characters represent shepherds or other country people. Except in such cases as the Dorsetshire poems of Barnes, it is a perfectly artificial genre, and the rustic setting does little more than mask the thoughts and emotions of the country and era in which the pastorals are produced. The origin of the pastoral must be sought in classical literature. Adianus makes Stasichorus of Himera (d. about 555 B.C.) its inventor, but the earliest extant pastorals are those of Theocritus (c. 270 B.C.). In these may be found the germ of the European pastoral, and many of the names of the shepherds and shepherdesses of Theocritus (e.g. Lycidas, Corydon, Daphnis, and Amyrillus) did duty in all countries. Virgil's ten *Ecloques* also exercised considerable influence. In Italy the first vernacular pastoral romance is the *Ameto* of Boccaccio (1342), but a more famous example is Sannazaro's *Arcadia* (1504). Petrarch, and after him Mantuan, made the pastoral a veil for satiric treatment of women, courtiers, and ecclesiastics. Spenser's *Shepherd's Calendar* (1579) owes much to the pastorals of Mantuan. The first pastoral drama was Politian's *Favola di Orfeo*, which was produced at Mantua in 1472, and the most famous of its followers was the *Aminta* of Tasso (1573). The most famous Sp. pastoral was Montemayor's romance of *Diana* (1558), well known in Elizabethan England. In 1590 appeared Sir Philip Sidney's prose romance of *Arcadia*, which had, however, been written many years before. Many of the Elizabethan dramatists also wrote romances, mainly in the manner of *Euphues*. The best known of these is Lodge's *Rosalinde* (1590). The pastoral drama found its three greatest exponents in Fletcher (*The Faithful Shepherdess*), Shakespeare (*As You Like It*), and Ben Jonson (*The Sad Shepherd*). There was a revival of the pastoral in the eighteenth century, which gave the pastorals of Pope and Ambrose Phillips, over which the pair quarrelled. Gay's *Shepherd Week* was intended as a parody of Phillips's, but was, in point of fact, the best of the group. It was, however, surpassed by Ramsay's *Gentle Shepherd* (1728), in which the artificial element is less obtrusive. Since that time the pastoral has not been a popular poetic form. See E. K. Chambers, *English Pastorals*, 1887, and W. W. Greg, *Pastoral Poetry and Pastoral Drama*, 1906.

Pastoral Staff, see CROSIER and LISMORE CROSIER.

Pastoral Theology, branch of theology which deals with the duties of the clergy as shepherds of souls.

Pasture, strictly a term applied to permanent grassland which is grazed but never mown, but often applied also to land which is both grazed and mown. Permanent P. is land which has been continuously under grass since it was sown from seeds, or since it went out of cultivation, and was allowed to sow itself. For temporary P. or ley the quicker-growing clovers and grasses are sown, to reach maturity within the period of the ley, and yet to yield a uniform rate of produce throughout the period. P. land in Britain has enormously increased since about 1870, but much of it is of inferior quality.

Pasuruan, or **Passaruan**, tn. of E. Java, on the N. coast, 50 m. by railway S.S.E. of Surabaya. It has considerable trade. Pop. 25,000.

Patagonia, S. portion of S. America, lying E. and W. of the Andes, and divided between Chile and Argentina. The name P. arises from the nickname 'Patagones,' or big feet, applied by early Sp. explorers to the clumsily shod aborigines of the extreme S. The Chilean portion lies S. of Llanquihue and comprises the provs. of Chiloé and Magallanes (Magellan ter.), while the Argentine extends S. from the Rio Negro, Chubut (q.v.), and part of Santa Cruz. The whole W. region is occupied by the Andes, rising from 3000 to 6000 ft., with forests on the lower slopes; the rainfall is very heavy. The E. dist. is a plateau, rising in terraced fashion with layers of sandstone and basalt. A great part is barren, but in the N. part irrigation enables wheat to be grown, and immense flocks of sheep graze the plains. The greater part is a vast plateau, almost uninhabited; the ter. of Santa Cruz has barely one inhab. to 25 sq. m. W. H. Hudson says: 'It has a look of antiquity, of desolation, of eternal peace, of a desert that has been a desert from of old, and will continue a desert for ever.' In the Chilean portion of Tierra del Fuego is Punta Arenas, a flourishing tn. and port, with a very large trade in wool. According to 1945 figures there were 5,500,000 head of sheep in Chubut, 8,500,000 in Santa Cruz, 850,000 in Argentine Tierra del Fuego, 1,000,000 in Neuquén, and 2,710,000 in Rio Negro. Local output of wool averages 50,400 tons per annum. The total area of P. is about 400,000 sq. m. The original natives belonged to two races, the Tehuelches, noted for their great stature, and the Gennakens, who are practically extinct. See also TIERRA DEL FUEGO. See W. H. Hudson, *Idle Days in Patagonia*, 1893.

Patagonian Language, see under SOUTH AMERICAN NATIVE LANGUAGES, *Southern Grassland and Forest*.

Patan: 1. Tn. of Nepal, India, 5 m. S.S.W. of Khatmandu. Pop. 105,000. 2. Walled tn. of Baroda, India, 64 m. N.N.W. of Ahmedabad, with manufs. of

swords, spears, and silk and cotton stuffs. There are numerous Jain temples. Pop. 38,000. 3. Tn. of Rajputana, 60 m. N.N.E. of Jaipur. Pop. 8000. 4. Tn. of Kathiawar Peninsula, Bombay, see SOMNATH.

Patang, see BAANFU.

Patani: Mionthon or state of Siam, between Kolautan and Singora, on the E. coast of the Malay Peninsula. Area 6000 sq. m. Pop. 295,000. 2. Tn., cap. of the above state, on the E. coast, in about 6° 51' N. 3. Tn. of the is. of Gilolo, Malay Archipelago, on the S.E. peninsula; inhabited mainly by Dutch 'post-holders.' 4. Cape on the E. coast of the Malay Peninsula, at the entrance to the gulf of Siam. 5. Riv. of Siam, Malay Peninsula, flowing N.E. and N. through P. into the gulf of Siam in about 6° 55' N.

Patavium, see PADUA.

Patch, Alexander McCarrell (1889-1945), Amer. soldier, b. in Arizona, son of a captain of West Point Military Academy. P. entered West Point in 1909, and was distinguished as an athlete. In the First World War he was a director of the Army Machine-Gun School in France, and later served in the Aisne-Marne, St. Mihiel, and Argonne offensives. In 1936 he joined the Infantry Board at Fort Benning in Georgia, after diligent study at the general staff school and at the army college. In 1941 he commanded the infantry training centre at Camp Croft, in S. Carolina. In 1943 he was put in command of ground forces at Guadalcanal, taking part in the assault which drove the Jap. from the Henderson Field area, personally leading the attack which stormed Mt. Austin. In March 1944 he succeeded Gen. Patton in command of the Amer. Seventh Army, leading the Amer. ground forces in the invasion of S. France. See further under WESTERN FRONT IN SECOND WORLD WAR.

Patching, see under NEEDLEWORK.

Patchogue, tn. and summer resort of New York, U.S.A., in Suffolk co., on Long Is., 50 m. E. of Brooklyn. There is an oyster and fish trade, also manufs. of lace curtains. Pop. 7000.

Patchouli (*Popostemon patchouli*), a shrubby plant (family Labiate), bearing spikes of white flowers with purple marks. Its leaves are distilled to yield a volatile oil, and the plants are dried for stuffing mattresses and pillows, the odour being supposed to be disinfectant.

Patchwork, see under EMBROIDERY.

Patel, Framjee Nasarwanjee (1804-1894), Parsi merchant and philanthropist, b. in Bombay. In 1819 he began a successful business career in the firm of Frith, Bonanjee & Company. At this time in India prominent merchants became *de facto* bankers since few people had large capital resources. In 1844 P. founded the firm of Wallace & Company; from this he retired and in 1849 founded Framjee, Sands & Company. He will be remembered, however, for the work he did for his fellow countrymen in India. Since the Parsis were exiled from Persia, Parsi law was in a chaotic state, particularly as regards the laws of marriage

and intestacy. P. served on a commission to investigate this and became president of the Parsi Law Association. He d. one of the most revered and distinguished of the natives of India. The name P. means 'mayor' (of Bombay), a title conferred upon an ancestor of his by the Eng. in 1892.

Patel, Viththulbhai Jahverbhai (1873-1933), Indian nationalist leader, b. in Gujerat. Trained as a lawyer, he practised in Bombay. He was elected to the Bombay Assembly in 1912, and to the Imperial Assembly in 1917, and represented the Indian Congress at the London Conference of 1919 on the projected Government of India Act. In 1920 P. joined Gandhi's non-co-operation movement. He was elected mayor of Bombay, but was compelled to resign. He then became a leader of the Swarajist party, and was a member of the Legislative Assembly in 1930, showing intense opposition to Brit. rule. He died in exile in Switzerland.

Patella, see KNEE; LIMPET.

Patent, or Proprietary, Medicine, popular terms for a medicine or specific for the cure or relief of any ailment, and of which the proprietors claim an exclusive right of sale. By the Pharmacy and Medicines Act, 1941, no one may sell an article 'consisting of or comprising a substance recommended as a medicine' unless the appropriate designation of the substance or of each of the active constituents or ingredients, together with the quantitative particulars of the latter, are clearly legible on the label, container, or wrapper. 'Substance recommended as a medicine,' in this context, means a substance which is referred to in terms which are calculated to lead to the use of the substance for the prevention or treatment of any ailment, infirmity, or injury and not being terms which give a definite indication that the substance is intended for use as, or as part of, a food or drink and not as, or as part of, a medicine. Selling in contravention of the Act is punishable by fine up to £20 and, for a subsequent offence, £100 or three months' imprisonment or both. It is the statutory duty of the Pharmaceutical Society of Great Britain to enforce the Act. Prior to 1941 excise duties were chargeable on P. Ms.

Patents and Inventions. P., or more correctly letters patent, are documents in which the Crown vests a subject with special rights or privileges, e.g. the privileges appertaining to the peerage are conferred on a newly made peer by the issue of letters patent. This article is exclusively devoted to such letters patent as confer upon a person the sole right to make, use, and vend an invention for a limited period of time. Such a grant creates a monopoly (see MONOPOLIES) in favour of the patentee. Apart from copyright (q.v.) and trade marks (q.v.), P. are the only species of property which give an exclusive right. A trade mark differs from a patent by reason that 'it has not merit and the benefit of mankind as its consideration,' its object being 'to indicate the source from which an article

comes; not to restrain others from manufacturing such articles.' There can be and is in law no exclusive right in a mere secret, and the original possessor of, for example, a secret process of manuf., cannot, in the absence of some contract, prevent another person from making use of his secret if he be successful in acquiring the knowledge of it, though it would be otherwise if the latter acquired the information confidentially from the former or during the progress of experiments conducted by the former. Difficulties as to the person entitled to a particular invention have very frequently arisen between masters and servants. The whole of this part of the subject of P. is obscure, but the principle underlying all the cases is that an employer who conceives an idea has no right to the inventions of a man, whether servant or an independent, whom he employs to carry it out.

To be entitled to letters patent for an invention, the applicant must be either the 'true and first inventor' of the subject-matter or the 'true and first importer' of an invention from abroad. The first of the above two phrases by no means speaks for itself; but it is generally understood that an actual inventor includes not only a person who is incontestably and literally the first man to light upon and carry out a particular idea, but any one who has embodied in practical form some idea which, in the main, is his own, though others may have contributed suggestions in details and improvements which in themselves do not amount to distinct and separate inventions. But it must always be borne in mind that if any one who is concerned to upset a patent in the chancery div. of the high court can prove that the patent, though admittedly novel so far as the world generally is concerned, was not discovered by the ingenuity of the patentee, but was borrowed from some book or another person, the court will decide against the patentee. The 'true and first importer,' on the other hand, need have displayed no merit whatever to be entitled to a patent: e.g. he may be a mere agent or trustee of a foreign inventor. By the Patents and Designs Act, 1907, any person who has applied for protection for any patent in any foreign state with which the Brit. Gov. has entered into international arrangements for mutual protection of inventions is entitled to a patent for his invention in England in priority to other applicants, and such patent, on registration, will be dated as of the date of the protection previously obtained in the foreign state, provided the application is made within twelve months from the time of applying for protection in the foreign state. The above statutory provision applies also to such Brit. dominions as have entered into mutual arrangements with the mother country.

By the Statute of Monopolies (see under MONOPOLIES) P. for inventions last fourteen years, but this term was increased by an Act of 1919 to sixteen years. By the same Act the subject-matter of a valid patent can only be a 'new manufacture.'

and the Act of 1907 defines 'invention' by reference to the old Act. A valid patent may be granted in respect of (1) The discovery of a principle together with a method of applying it to a practical result or making it applicable to the production of a new manuf. (2) A new and useful combination of old parts. (3) The novel application of an old principle, provided a useful manuf. results; but the patentee cannot go outside the application which constitutes his invention, and the method of application must be really novel. (4) The application of an old material to a new purpose, provided there is actual novelty in the mode of using the old or known material or thing as distinct from the novelty of purpose. (5) The invention of processes for manufacturing well-known articles of commerce. (6) A new combination of new and old or all old processes, materials, or contrivances so as to produce or do something more cheaply or quickly or effectively than before. Even if the ultimate result of a combination be both novel and useful, the combination will not be patentable unless there is invention or 'manufacture' in the mode of combination itself. (7) A new product, material, or machine. 'Novelty' as construed by the courts is essential. Either the patentee must be the true and first inventor, or the subject-matter of the grant must be a new manuf. in itself, or newly introduced into the realm. In the law courts, where 'novelty' is in issue, the inquiry really turns on how far there has been such 'prior use' or 'prior pub.' as will invalidate the patent. In this context it is to be noted that if a man makes an invention, the object of which is to obtain a new result, the patent is entitled to a much more liberal construction by the courts than if the invention were merely to obtain an old result by new means.

The element of novelty may be summed up in the following propositions: (1) If once the public generally become cognisant of an invention, no matter by what means, no patent can be granted for it. But everything essential to the invention must have been known in order to invalidate the grant. (2) The use of a thing for any particular purpose is not an 'anticipation' of a patent which claims the use of the same thing for an entirely different purpose. (3) Novelty is not the same as discovery, for a thing may have been discovered before, but never made public. (4) An invention that has been previously made by someone else, even though not disclosed to the public, is said to have been 'anticipated,' and if such anticipation be proved a patent cannot stand. (5) A prior unsuccessful experiment or useless machine is no pub. (6) Offering for sale amounts to pub. only if the article offered for sale shows the manner of its manuf. (7) Prior use in a Brit. dominion or colony will not bar the right to a patent in England. (8) Imparting a secret to another or others in confidence is not communication to the public unless the public generally have by reason thereof in fact become fully acquainted with the inven-

tion. (9) It is useless to try to upset a patent on the ground that some pub. book contains it, if in reality the book contains merely a suggestion of the invention as opposed to such a description as would enable a person to effect the manuf. The above principles may appear in the highest degree technical; but it is pertinent to observe that the progress of opinion against monopolies is inherently opposed to the endowment of any individual effort that cannot properly lay claim to originality.

To apply for a patent the inventor must first file a provisional or complete specification of the nature of his invention at the Patent Office, 25 Southampton Buildings, London, W.C. The services of an accredited patent agent are usually employed by the inventor to draw up the specification, for an substantial error in preparing the document may render the patent void; and further, if at any time during the subsistence of a patent some one can show that the description in the specification is so incomplete that no one could produce the result claimed, the patent will be null and void. Sometimes, however, a patentee will be allowed to amend his specification if the erroneous parts do not vitiate the whole patent. After the specification has been deposited the examiner of the Patent Office investigates the application in order to see whether the specification and drawings properly describe the invention, and whether the invention claimed has in fact been described in some anterior specification deposited at the office in connection with any application for a patent made within fifty years next before the date of the application under examination. (A prior provisional specification not followed by a complete specification will not affect the claim.) The comptroller-general of P. having satisfied himself that the above requirements have been satisfied, causes the specification to be advertised in the official jour. of P. The patent will then be sealed after two months, provided there is no opposition. There are only four grounds of opposition: (a) That the applicant got his invention from the opponent; (b) that the invention has been claimed in a complete specification for a Brit. patent of prior date other than one deposited pursuant to an application made over fifty years before the date of the application for the opposed patent; (c) that the specification does not sufficiently or fairly describe the nature of the invention or the manner in which it is to be performed; (d) that the complete specification describes and claims an invention different from that described in the provisional specification (a provisional specification protects for six months), and that the former really forms the subject-matter of an application made by the opponent in the interval between the hearing of the provisional specification and the complete specification. The comptroller's powers (which are subject to an appeal to the attorney-general) are, as may be inferred from the above enumeration of grounds of opposition, limited to determining either

the identity of an invention, or whether the applicant is fraudulent; he cannot oust the jurisdiction of the courts by deciding a question of infringement. The fees on patents for inventions are:

	£	s.	d.
On application for provisional protection	1	0	0
On filing complete specification	1	0	0
On notice to have patent sealed	1	0	0
On application for certificate of payment of renewal:			
Before the expiration of the 4th year from the date of patent, and in respect of the 5th year, £5; of the 6th year £8; and so on up to the 16th year	12	0	0
Total	13	0	0

Other small fees are also payable as may from time to time be presented by the Board of Trade.

Revocation.—Any person may petition to revoke a patent on the ground (a) that it was obtained in fraud of his rights, (b) that he and not the grantee was the true inventor, or (c) that he has publicly used or sold the thing claimed as an invention before the date of the patent. If the petitioner satisfies the court that he is right, he may himself be granted a patent to expire on the date the revoked patent would have expired. A patent not less than four years old may also be revoked by the comptroller at the instance of any one who shows that it has, during those four years, been worked mainly outside the United Kingdom.

Compulsory Licences.—A patentee may be ordered by the court to grant licences to work his patent if it can be shown that he has not himself adequately worked his patent, or manufactured his patented article, or granted licences on reasonable terms, so as to prejudice any existing, or the estab. of any new, industry.

Infringement.—The remedy for infringement is by injunction (*q.v.*) to restrain further infringements, coupled with a claim either for damages or for an inquiry as to profits in respect of past infringements. The usual defences to such an action are: (a) A denial of infringement; (b) a denial that the plaintiff was the first and true inventor; (c) a denial of novelty; (d) an allegation of the insufficiency or incompleteness of the specification; (e) an allegation that the patent has been worked principally abroad; (f) an allegation of fraud on the defendant's rights; and (g) a denial of utility (doubtful as a defence).

The procedure in applications for the grant of P. is contained in the P. Rules, 1920 (Statutory Rules and Orders, 1920, No. 438). These rules repeal those in existence prior to March 31, 1920. The full list of fees payable on the grant of P. is contained in the first schedule to these rules.

In view of much criticism of the existing Patents and Designs Acts the gov. in 1944 appointed a departmental com-

mittee under the chairmanship of Kenneth R. Swan to consider what changes were desirable in the Acts (1907-38), and in the practice of the Patent Office and the courts. Recommendations made in the first interim report of the Swan Committee (Cmd. 6618, April 1945) were embodied in a short amending Act of 1946. This Act modified existing practice as a matter of urgency in view of patents lapsing daily, to enable patentees, who had been prevented from working their P. by war restrictions, to resume working under extended patent protection as soon as possible.

Important changes in the law relating to P. and registered designs were made by the gov. in an Act to give effect to many of the recommendations of the Swan Committee's second interim and final reports (Cmd. 6789, April 1946, and Cmd. 7206, Sept. 1947). The new Act makes no changes in fundamental principles, but adapts patent law to modern requirements. One of the main purposes of the Act is to strengthen the provision against abuse of patent rights or the insufficient use of patented inventions. This is to ensure that inventions are used to the fullest extent to increase industrial efficiency. All the existing remedies are retained, but the circumstances in which they can be resorted to are extended to cover cases where the invention is not being worked to the fullest extent, or where an export market is not being supplied, or where the working of another patent is hindered by the refusal of the patentee to grant a licence on reasonable terms. The Act provides for action being taken by a gov. dept. in the public interest, particularly in cases adversely reported on by the new Monopolies and Restrictive Practices Commission. This commission has power to inquire into all restrictive practices affecting P., but the Act which constituted it does not provide specific action to follow on adverse reports. Other clauses modify the provisions relating to the use of patented inventions for the service of the Crown, and make permanent provision for ensuring secrecy of inventions in the interests of the defence of the realm. The courts have held that when the patentee himself uses an invention for the services of the Crown a gov. dept. cannot relieve him from his contractual obligations to other persons. The Act provides this relief. When others are authorised to use the invention the patentee will, in general, receive compensation, but it is provided that he shall be liable to share this with any other person entitled to contractual rights against him. The Act also provides that an application for a patent may be made by the assignee of an inventor, and an inventor's application may be taken over at any time by his assignee. There will be introduced a new system of dating P. and allowing priority based either on provisional specifications or on earlier applications in countries belonging to the International Convention for the Protection of Industrial Property. Another amendment of the law will help to protect

the position of an inventor who is an employee in the event of a dispute arising with his employer as to the rights of the parties in respect of the invention. Power is given to the comptroller of P. to settle such disputes in appropriate cases, and he may act upon an application by either of the parties. This will enable an inventor to have a claim decided without incurring the heavy expense of a court action against an employer. It is proposed that in future all appeals from the comptroller's decisions should go to the P. Appeal Tribunal. The Act came into operation on Jan. 1, 1950.

In order to secure for Britain and its industries the benefit of inventions and discoveries by Brit. scientists the gov. in April 1948 introduced a Bill to establish a national corporation for the development and exploitation of inventions, to which body the Board of Trade may make advances of up to £5,000,000, within five years of its estab., for working capital. The functions of the corporation are to secure, where the public interest so requires, the development or exploitation of inventions which result from research by gov. or other organisations financed by public funds, and of any other invention as to which it appears to the corporation that it is not being developed or exploited or sufficiently developed or exploited; and to hold rights in inventions and to grant or dispose of such rights for consideration or otherwise. This Bill makes no proposals affecting the law of P., but legislation to amend the Patents and Designs Acts is under consideration.

There is considerable similarity between Eng. and Amer. patent law. Perhaps one of the most important distinctions is that while Eng. law regards public advantage in the first place, Amer. law looks to the reward of the inventor for his industry. The best definition of patent ability in the U.S.A. is given in the revised statutes as amended in 1897 (the amendments are italicised):

'Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof or more than two years prior to his application, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned, may, upon payment of the fees required by law and other due proceedings had, obtain a patent therefor.'

Under the law of 1790 the duty of granting P. was discharged by the secretary of state, the secretary of war, and the attorney-general. From 1793 to 1836, the law being almost identical with Eng. law, the duty fell to the secretary of state, subject to the approval of the attorney-general.

From 1837 onwards the divergence of

Amer. from Eng. law began. In that year a P. office was opened: there is a commissioner of P., with assistants and examiners; he is appointed by the president, and has extensive power in interpreting the patent law. An official *Gazette* is pub. In applying for a patent the first step is to lodge an application, giving details and, if necessary, drawings and models. The fee for filing this application is \$15. The applicant must verify his claim by oath before any person competent to administer oaths. If on examination the commissioner is satisfied, the patent is issued, and a further fee of \$20 must be paid within six months. The maximum period is seventeen years.

Designs.—See TRADE MARKS and TRADE NAMES; also COPYRIGHT.

See R. Hadden, *Compendium of Patents and Designs Law and Practice in Great Britain and Abroad*, 1931, with replacement sheets to 1942; P. Meinhardt, *Inventions, Patents, and Monopoly*, 1946; and T. Ferrell, *Law and Practice relating to Letters Patent for Inventions* (9th ed. by K. E. Shelley, 1947).

Pater, Walter Horatio (1839-94), Eng. critic and humanist, b. at Shadwell, London; educated at Enfield, Canterbury, and Queen's College, Oxford. In 1864 he became fellow of Brasenose College, in 1865 M.A., in 1866 junior dean, in 1867 tutor, in 1871 dean, and in 1873 lecturer. He was associated with the Pre-Raphaelites, especially with Swinburne. His literary celebrity dates from an essay on Winckelmann, pub. in the *Westminster Review* in 1867. P. has a definite place in the growth of the Romantic movement, which developed first into the Pre-Raphaelite phase and then into the aesthetic. His writings crystallised this latter before it degenerated into extravagance. With the apparent undermining of religion by science and with the increasing ugliness of civilisation, beauty and truth seemed to be found together only in works of art, or at moments in nature, or in transient experience. P. defined this creed in the conclusion to *The Renaissance*. In *Marius the Epicurean* its application to lit. was portrayed in the 'sensations and ideas' of its hero, set deliberately in an epoch of transition in the past. Of P.'s style George Moore said: 'In the pages of Pater the English language has its state.' His works include *Studies in the History of the Renaissance* (1872, 1877); *Marius the Epicurean* (1885; Everyman's Library, 1934); *Imaginary Portraits* (1887); *Appreciations. With an Essay on Style* (1889); *Plato and Platonism* (1893); *An Imaginary Portrait: the Child in the House* (1894); *Greek Studies and Miscellaneous Studies*, prepared for the press by C. L. Shadwell, were pub. in 1895; and numerous essays in the *Fortnightly Review*, etc. He is caricatured as 'Mr. Rose' in W. H. Mallock's *The New Republic*, 1877. See lives by A. C. Benson, 1906, and Edward Thomas, 1913; and studies by A. Symonds, 1932, and J. G. Eaker, 1933; also R. Aldington (ed.), *Walter Pater: Selected Works*, 1948.

Paterculus, Marcus Velleius (c. 19 B.C.-A.D. 31), Rom. historian; fought with Tiberius in Germany and Illyria, and in A.D. 14 was praetor. His two-volumed *Historia Romana*, in which he treats of Gk. as well as Rom. hist., has survived.

Paterniacum, see **PAYERN**.

Paterno, tn. of Sicily, prov. of Catania, at the foot of Mt. Etna, and built on the site of the anc. Hybla Galeatis. There are mineral springs, and a trade in wine, flax, and olive oil. Pop. 36,000.

Paterson, William (1858-1719), Brit. bank projector, b. in Dumfriesshire and brought up in England. He was a wealthy and influential merchant, and in 1681 became a member of the Merchant Taylors' Company. He was one of the founders of the Bank of England, and it is said that the project originated with him in 1691. On the foundation of the bank in 1694 he became a director. In 1695, owing to a disagreement with his colleagues, he withdrew from the board and devoted himself to the colony at Darien, unsuccessfully planted in 1698.

Paterson: 1. City of New Jersey, U.S.A., and the cap. of Passaic co., on the Passaic R., 17 m. N.W. of New York. It is a great manufacturing centre, and is styled the 'Lyons of America,' because of its extensive silk industry. There are also cotton and paper factories, rolling mills, etc. Pop. 139,600. 2. Tn. of New S. Wales, Australia, in Durham co., on the Paterson R., 25 m. N.N.W. of Newcastle. Pop. 5000.

Pathans, Muslim race living on and beyond the N.W. frontier of India. Including the Mohmands, Afridi, Wazirs, Mahsuds, Khattaks, and Yussufzais. Many members of these tribes were at one time enlisted in the Indian Army.

Pathe, named used by one of Britain's leading film production and distribution companies, which in 1919 changed its title from P. Pictures to Associated Brit.-P. Ltd. Founded as P. Freres Ltd., by Charles Pathe in 1911, the company produced Britain's first newsreel, still issued twice weekly under the title of *Pathe News*, and Britain's only weekly screen magazine, the popular *Pathe Pictorial*. The P. trade mark, a crowing cockerel, appears on many screens throughout the world, the company having newsreel affiliations with the *Pathe Journal* of France and the *Warner-Pathe News* of America. In 1911 P. Pictures took over the distribution of the entire film output of the Associated Brit. Picture Corporation, and the company has since functioned as the distributing arm of that organisation which, besides controlling Britain's largest cinema circuit of 430 cinemas (A.B.C.), owns the reconstructed Elstree studios and Welwyn studios. A subsidiary company, Brit. Instructional Films Ltd., produces educational films and filmstrips in conjunction with P. In Wardour Street P. operate the only fully equipped film studio in London's W. End, on the site of the original studio used by Charles Pathe. Associated Brit.-P. now produce and distribute over 300 films a year, ranging from educational

'shorts' and documentaries to full-length documentary and entertainment features. The company was among the first in Britain to produce and adapt films specially for the Amer. television market. Among the more famous feature films distributed by Associated Brit.-P. after the Second World War were *The Dancing Years*, *The Intruder*, *The Hasty Heart*, *Private Angelo*, *The Queen of Spades*, *Scrapbook for 1922*, *Scrapbook for 1933*, *The Peaceful Years 1919-1939*, *The Guinea Pig*, *No Room at the Inn*, *My Brother Jonathan*, *Brighton Rock*, and *Piccadilly Incident*.

Pathology, science of disease, including structural abnormalities not usually regarded as diseases. Health may be considered as the condition in which structure and function are perfect. Symptoms of disturbance of function may be subjective or objective, or both. Such disturbance is associated with change in structure of cells, tissues, or organs, and this structural change may be either physical, chemical, or anatomical, and may be visible to the naked eye, or revealed only by microscopic examination. Microscopic changes are the prov. of pathological histology; others are included in pathological anatomy. Pathogenesis is the description of the changes from their beginning and during their course; the inquiry into their causes forms the dept. of aetiology. Until Virchow pub. his *Cellular Pathology* in 1858, the science was hardly in existence, for not until the microscope revealed the fact that man was a community of living cells was it recognised that their vicissitudes were the true basis of the study of human disease. The rapid rise and wonderful development of biochemistry has made important contributions to knowledge of the metabolism of the cell in health and in some forms of disease; of the production of endocrines and their effect on the body; of toxins and antitoxins. Pasteur's (q.v.) work, originally chemical, in connection with fermentation led to bacteriological science, and showed that the cell had friends and enemies; his eradication of specific disease among silkworms conclusively showed how science could wage war on germs inimical to cells. Koch's discovery of the anthrax parasite in 1876 and the tubercle bacillus in 1882, by his culture method of isolating bacteria, led to the discovery of the organisms responsible for fowl cholera, septic disease, typhoid, cholera, diphtheria, tetanus, etc. Lister's work in antiseptic treatment of wounds was of equal importance, and Jenner's in smallpox; nor must the peculiar genius of Huxley, outside the ranks of medical scientists, be overlooked. In 1893 Theobald Smith, in the case of bovine malaria or Texas fever, showed for the first time that parasites (q.v.) such as the tick could act as intermediary hosts and transfer disease from animal to animal; Manson and Ross proved that malaria was transmitted by a mosquito (*Anopheles*), so that every parasite has subsequently been a suspected agent in the transmission of disease. Ehrlich's researches in chemotherapy, with his theory

of 'side-chains' or 'receptors,' proved of great use in practical investigations. Metchnikoff's study of immunity and the discovery of anti-toxin by von Behring were also landmarks in the general advance. Some advance has been made in classification of parasitic diseases; of those due to schizomycetes (bacteria), suppuration and septicaemia, erysipelas, infective endocarditis and gonorrhoea are caused by pyogenic micrococci; specific bacilli are responsible for cholera, plague, pneumonia, etc.; hydrophobia, measles, and mumps are caused by viruses, whilst scarlet fever is an infection by a streptococcus. Protozoa are the cause of dysentery, malaria, black-water fever, etc., while other animal parasites, such as tapeworms, hookworms, and threadworms, are responsible for other types of diseases. Sexually transmitted diseases, such as actinomycosis, Madura foot, aspergillosis, and ringworm, have been traced to plant parasites.

The study of healing processes in wounds, as observed when means are taken to prevent the attack of germs, has shown that cells are capable of readjusting, after disturbance, the normal healthy life. Some leucocytes in great numbers accumulate and carry off the dead cells, while others are phagocytic and destroy the attacking micro-organisms; at the same time the blood-vessels penetrate the disturbed area, the capillaries budding and anastomosing, so producing a new vascular system. Such recuperative power points to the possibility of similar processes in all forms of disease, even when deeply seated. Advancing age is a condition which may be healthy decay as distinguished from disease setting in. Other causes are largely within our control: general unhealthy surroundings, which our form of civilisation has produced but not yet remedied; a general malnutrition; the imposition of too much effort on certain organs, too little on others. Of nutritional diseases, rickets, beri-beri, and scurvy are amongst those due to deficiency in vitamins. Insufficient food and deficiency of any essential article of diet, such as protein, will also cause disease. Extremes of temp. cause the pathological phenomena of frostbite and burns. Chemical agents may induce various diseases, of which lead poisoning and phosphorus poisoning are common examples. Considerations of the conditions that are under our control have led to the attempt more clearly to define what are the natural conditions outside the body which aid recuperation. In the case of tuberculosis, sunshine and fresh air, together with rest, have already proved the enormous extent to which they aid recuperative processes. Perhaps the greatest problem is faced with is that of cancer, for which no certain cure can yet be announced, though steady progress has been made in treatment by surgery, X-rays, radium, and hormones (e.g. stilboestrol); the classification of different types of cancer based on the microscopic appearance of the cells has been placed on a firmer basis. Since some diseases and predispositions are

hereditary, P. involves some knowledge of heredity (q.v.). Haemophilia, colour blindness, diabetes, and certain deformities are transmitted, and tendencies to diseases such as tuberculosis; these tendencies need not be realised if the conditions of life are wisely controlled. Throughout all the progress since the middle of the nineteenth century there has been a steadily increasing knowledge of the physiology of the human body; organs such as the thymus gland and suprarenal bodies, the pituitary, parathyroid, and thyroid glands, have been more fully investigated and at least part of their function discovered. Some progress has been made in the recognition of the relation between psychogenic phenomena and the glandular secretions, and possibly the greatest advances in the future will be made in connection with psychopathology. The discovery of the sulphanamide drugs, such as sulphanilamide, and antibiotics such as penicillin (q.v.), streptomycin and chloromycin, have provided new weapons in the battle against bacteria. See also BIOLOGY; BACTERIOLOGY; PARASITOLOGY; CANCER; HOPKINS, SIR FREDERICK GOWLAND; PSYCHOPATHOLOGY; TUBERCULOSIS; VITAMINS.

See E. R. Long, *History of Pathology*, 1928; A. W. Hewlett, *Pathological Physiology of Internal Diseases* (3rd ed.), 1928; H. D. Power and W. W. Hala, *Principles of Pathology*, 1929; W. G. MacCallum, *Pathology* (7th ed.), 1940; R. Muir, *Textbook of Pathology* (5th ed.), 1942; W. Boyd, *Surgical Pathology* (5th ed.), 1943; H. T. Karsner, *Human Pathology* (6th ed.), 1943; E. T. Bell, *Textbook of Pathology* (5th ed.), 1944; and E. H. Kettle, *Pathology of Tumours* (3rd ed.), 1945.

Patiala and E. Punjab States Union, federation of Indian states set up on May 5, 1948. It is formed of the states of Patialkot, Jind, Kalisi, Kapurthala, Mairkotla, Nabha, Nalagarh, and Patiala, and more than one-third of the mahals are Sikhs. Area 10,119 sq.m. Pop. 3,421,000 (of which about 2,000,000 are in Patiala state).

Pathology of Plants, see PLANTS.

Patino, see PATMON.

Patmore, Coventry Kersey Dighton (1823-96), Eng. poet, b. at Woodford, Essex, the son of Peter George P. (1786-1855), author and sometime editor of the *New Monthly Review*; began to write poetry while still at school, and pub. his first vol. of verse in 1844. Two years later he was appointed to an assistant librarianship in the Brit. Museum. In 1849 he contributed to the organ of the Pre-Raphaelites, the *Germ*. He was largely responsible for promoting the volunteer movement of 1861. His principal poetical works are *Poems* (1844); *The Betrothal* (1854); *The Espousals* (1856); *Faithful for ever* (1860); and *The Victories of Love* (1862); the four poems, and a selection of earlier poems, making up *The Angel in the House* (1863); *Odes* (1868); and *The Unknown Keros* (1877). While he is not to be identified with the intellectual movement of the mid-nineteenth century with the Pre-Raphaelites,

he has a gift of verse somewhat akin to Wordsworth's in its simple, dignified treatment of homely themes. *The Angel in the House* is really a novel in verse, with domestic virtues as its poetical theme. The more philosophical parts of the poem reveal the mysticism which is to be found still more developed in *The Unknown Eros*, a series of odes notable for the poet's power of expressing intricate thought in verse. Eds. of his poems include that of 1897 (new uniform ed.) and of B. Champneys (1908), who ed. also his correspondence, 1900. *See studies* by Sir E. Gosse, 1905, and O. Burdett, 1921; also F. Page, *Palmore: a Study in Poetry*, 1933; D. Palmore, *Portrait of my Family, 1783-1790*, 1935, and (ed.) *The Life and Times of Coventry Palmore*, 1949.

Patmos (It. *Patmo*; Turkish, *Batmos*), volcanic, rocky, and barren is. (length 10 m., greatest breadth 6 m.) belonging to the Sporades, in the E. Aegean. It was ceded to Italy by Turkey in 1924. Here St. John the Evangelist is believed to have written his Revelations after his banishment by Domitian in A.D. 95. The monastery of St. John was founded in 1098 by St. Christodoulos. Pop. 3100.

Patna, name of a div., dist., and city in the prov. of Bihar and Orissa, India: 1. The div. comprises the dists. of P. Gaya, and Shahabad which lie S. of the Ganges. Before 1904 it embraced what is now the div. of Tirhut. Area 11,338 sq. m. Pop. 2,266,000. 2. The dist., which covers 2164 sq. m., is watered by the Ganges and the Son. The Raigir Hills, in the S.E., interrupt a broad fertile plain, but rarely exceed 1000 ft. in height. Wheat, rice, maize, barley, and potatoes are cultivated. Pop. 2,162,000. 3. The city, the cap. of Bihar, lies on the Ganges, opposite the confluence of the Gandak, 144 m. E. of Benares. It exports tobacco, opium, oil, and indigo. Europeans live in the suburb of Bankipur. The P. high court came into existence in 1916. There is a federal univ., founded 1917, and a fine library. The tola is an immense circular structure built in 1786, and now used as a public granary. The auct. and beautiful Patliputra, which Megasthenes describes as Palibothra, and which Asoka aggrandised, once stood on the site of P. Pop. 177,000.

Paton, Sir Joseph Noel (1821-1902), Scottish painter of the modern school, b. at Dunfermline, Fife. At a comparatively early age he attained considerable celebrity by the imaginative tendency of his works, the subjects of which were usually of a spiritual nature or dealt with some episode of fairy life. Thus the 'Quarrel of Oberon and Titania' exhibits much imaginative power and a bewildering variety of detail. In such pictures, again as 'Lux in Tenebris' and 'Mora Janna Vitae' and 'The Evening Star' he achieved a height of spirituality which few modern painters have equalled. A famous rose window in Dunfermline Abbey was designed by him. He achieved some success as a poet, and many of his songs have been set to music.

Patras, or **Patrae**, centre of the export trade of Greece and the cap. of the prefecture of Achaea and Elis, on the gulf of Patras, 13 m. S.W. of Lepanto. It exports wines, currants, woollen goods, skins, fruit, honey, and olive oil. An important city in the days of Augustus, it became the cap. of Achaea under the E. empire, but was destroyed by the Turks in 1828. The modern city is built to a regular plan. Pop. 61,200.

Patras, Gulf of, inlet of the Ionian Sea, opening out of the gulf of Corinth, between Acarnania to the N. and Morea to the S., on the W. coast of Greece. Length 22 m.

Patres Conscripti, *see* under **SENATE**.

Patriarch (Gk. *patriarchēs*, the head of a family): 1. Name given to the fathers of the human race, spoken of in the Scripture hist., such as Noah, and also to the great progenitors of the Heb. race, Abraham, Isaac, Jacob, and Jacob's twelve sons. 2. Name also given in the Christian Church to the bishops of certain metropolitan sees, especially in the E. The sixth canon of the Nicene Council mentions Rome, Antioch, and Alexandria as the three metropolitan sees at the time.

Patriarchs (Lat. *patriarchi*, the kin of the *patres*, or heads of the old Rom. *gentes*, or tribes) were the aristocracy of auct. Rome. In primitive times they were the whole *populus Romanus* (Rom. people), who assembled together in the national *comitia curiata*. The political hist. of early Rome is an account of the fierce and prolonged struggle between the upstart plebeians, sprung chiefly from the conquered tribes, and the hereditary P., descended from the old Rom. families. The victory rested with the former, who by 300 B.C. were eligible for all the offices of state, from the questorship to the dictatorship, and even for the pontificate, long jealously withheld. Under the old Rom. law no child was released from *patria potestas* (father's power) by having any dignity or office (except a vestal virgin). Justinian conferred the privilege of being *sui juris* or independent of the paternal power on those enjoying the dignity of the *patriarchate*, the son being freed immediately on the grant of the imperial patent. Constantine changed the meaning of *patriarchus*, by making it a title of the highest honour conferred on persons who enjoyed the chief place in the emperor's esteem. The power of making *patriarchi* was, in general, used very sparingly by the emperors, and hence the title became an object of ambition even to foreign princes. The auct. order of *patriarchi* was in time replaced by the *nobles*, whose rank depended on their wealth and office.

Patrick, Saint (c. 380-4 461), distinguished missionary of the fifth century, commonly known as the Apostle of Ireland. Of his bp. it is only known for certain, from his own confession, that his father had a small farm near Bonavem Taberniae; and in one of the auct. lives he is said to have been born at Northur. Arguing on these data, connected with other collateral indications, some writers assign his bp. to the present Boulgne-sur-Mer; others to a place in the estuary

of the Olyde (called from him Kilpatrick). His father, he himself tells, was a deacon named Calpurnius; his mother, according to the anc. biographers, was named Conches, or Conchessa. P.'s original name is said to have been Sucrath, Patricius being the Rom. appellation by which he was known. In his sixteenth year he was seized while at his father's farm at Bonavent Tabernie by a band of pirates and sold to a petty chief, in whose service he remained for six years; after which he succeeded in effecting his escape, and went to France, where he became a monk, first at Tours, and afterwards in the celebrated monastery of Lérins. In the year 431 he went to Rome, whence he was sent by the pope of the day, Celestine, to preach in Ireland, but Dr. Todd fixes the date of his coming to Ireland eight years later. By degrees he visited a large portion of the kingdom, and baptised great numbers. According to the accounts of his Irish biographers, he founded 363 churches, and baptised with his own hand 12,000 persons. He is said also to have ordained a vast number of priests, and to have blessed very many monks and nuns. After he had been about twenty years engaged in his missionary enterprise, he is said to have fixed his see at Armagh about the year 454; and having procured two of his disciples to be ordained bishops, he held probably more than one synod. The foundations which he estab. for the Church in Ireland proved solid and lasting. He died at a place called Saul, near Downpatrick; and his relics were preserved at Downpatrick down to the Reformation. He is commemorated on March 17, a Holy Day of Obligation in Ireland. The only authentic literary remains of St. P. are his *Confessio* and a letter (*Epistola ad christianos*), both of very rude Latinity, but of much historical interest. The letter is addressed to Coroticus, who is supposed to have been a Welsh chieftain named Caradoc, who had made a descent on the Irish coast, and slain or carried off a number of the Irish, many of whom were neophytes. Both works were ed. by N. White (Dublin, 1905). See lives by J. H. Todd, 1893. J. B. Bury, 1905, and E. MacNeill, 1934.

Patricroft, tn. of S.E. Lancashire, England, 5 m. W. of Manchester, with silk throwing and weaving mills, cotton mills, quilting factories, iron works, etc. Pop. 21,000.

Patricians, see MONARCHIANISM.
Patristic Literature, see FATHERS OF THE CHURCH.

Patroclus, see ACHILLES.
Patrol, ultimately from Fr. *patrouiller* = *patouiller* - to flounder in mud), detachment of troops sent out in advance of the main body to reconnoitre the country and gain information as to the position and movements of the enemy. The same duties are now often carried out by armoured cars or tanks, and of course by reconnoitring aircraft during mobile warfare, especially during pursuit. Military Ps. are of two kinds: 'reconnaissance', usually in search of information above the ground, and especially about mines, and

'fighting' Ps., usually in search of information about enemy strength. They must fight to obtain prisoners or identifiable corpses. The chief non-military use of the term is in connection with motorised police detachments and the fire-fighting sections of forestry services. See also DOVER PATROL.

Patrology, see FATHERS OF THE CHURCH.
Patron (Lat. *patronus*, from *pater*, father), important term in Rom. law. It was the duty of the *patronus* to safeguard the interests of his *clientes* (dependants), men, that is, who were not admitted to the full rights of citizenship. The P. fed, boarded, and advised his client, gave him land usually, and was his representative in the eyes of the law. In return the client obeyed him, followed him to war, and gave him pecuniary aid. In the latter days of the republic the client was practically a free citizen; under the empire he was often merely a sycophant in his P.'s household. Technically a P. in this country is one who has church living in his gift, but the word is generally used of all benefactors and protectors, including the saints.

Pattern-making, see under CASTING.
Patti, Adelina Juana Maria (1843-1919), It. singer, b. at Madrid. At an early age she gave a series of concerts. After a course of training, she made her debut in New York in 1859 as Lucia in the opera by Donizetti. In 1861 she came to England and took London by storm with the exquisite clearness and beauty of her voice. The year after she went to Paris, and she resided there until 1870, paying yearly visits to London, where she remained the prime favourite for many years. Her most famous roles were those from *Puritani*, *Sonnambula*, *Norma*, *Tro-vatore*, *Lucia di Lammermoor*, and *Traviata*. In later years she gave up the stage for the concert hall. The last time she sang in public was at a St. John's Ambulance Association concert, Albert Hall, Oct. 24, 1914. She married the Marquis de Caux, but was divorced from him in 1885; in the following year she became the wife of the lt. tenor, Nicolini. On his death in 1898 she married the Baron Cederström. See H. Klein, *The Reign of Patti*, 1920.

Patti, port and cathedral city close to the gulf of P., in the prov. of Messina, Sicily. Its cathedral dates from the thirteenth century. Pop. (com.) 11,000.

Pattison, Mark (1813-81), Eng. author, b. at Hornby, Yorkshire; went in 1832 to Oriel College, Oxford. In 1861 he was elected rector of Lincoln College. In 1875 he pub. a biography of Isaac Casanbon. His *Sermons and Collected Essays*, ed. by Henry Nettleship, appeared in 1889. His memoirs, ed. by Mrs. P., were also pub. posthumously (1885).

Patton, George Smith (1885-1945), Amer. gener. b. at San Gabriel, California, of a family of soldiers. P. graduated at W. Point in 1909. Commissioned in the cavalry, he was aide-de-camp to Gen. Pershing in 1916 in Mexico, and later, in the First World War, was a captain on Pershing's staff and attended a course at the Fr. Tank School. He

organised the Amer. Tank Centre and also an Amer. tank brigade, which he commanded with distinction in the Saint-Mihiel attack of Sept. 1918, and later in the Meuse-Argonne battles. Between the world wars he held a cavalry command, served in Hawaii, and became a lieutenant-colonel. In 1940 he was appointed to command the 2nd Armoured Div., becoming, in 1941, commanding general of the First Armoured Corps. In anticipation of the allied N. African campaign he estab. a desert training centre in California and built a co-ordinated offensive force. He led the Amer. attack on Casablanca, and was afterwards chosen to command the Seventh Army in the invasion of Sicily. In April 1944 he was transferred to the W. front, taking command of the Third Army. He cut off the peninsula of Brittany and then swept on to Paris, the Ger. frontier, and the Siegfried line. When the Gers. made their last big effort of the war in the Ardennes offensive, P., whose forces were fiercely engaged on the Saar, answered the First Army's call for help by pulling out and changing direction to strike 60 m. northward over frozen roads against Rundstedt's (G.F.) flank, probably his greatest military feat. In the advance to the Rhine, after Rundstedt's repulse, he again played a leading part. Crossing the Rhine at Frankfurt, he maintained the impetus of his advance through central Germany and into Bohemia. Prague lay open to him, but for political reasons he was not allowed to occupy it, and at Pilsen his great advance ended. In April 1945 he was nominated a full general and his army occupied Bavaria. Owing to his scepticism over the necessity for the 'de-Nazification' programme, he was removed from the command of the Third Army and transferred to the command of a skeleton force, the Fifteenth Army. He died on Dec. 21, as the result of spinal injuries received in a motor accident near Mannheim twelve days previously. See J. Wellard, *The Man in a Helmet*, 1947.

Patun, see **PATAN**.

Pâturages, tn. in the prov. of Hainaut, Belgium, 5 m. S.W. of Mons. There are coal-mines, construction workshops, and manufs. of paints and shoes. Pop. 10,200.

Patzuaro, tn. of Mexico in the state of Michoacan, situated near the lake of the same name. The lake, which is 6700 ft. above sea level, is 30 m. in circumference, with native Tarascan vils. on its shores and is. Wildfowl and fish are abundant. The tn., which has narrow cobbled streets, is 270 m. from Mexico city. Pop. about 10,000.

Pau, cap. of the dept. of Basses-Pyrénées, France, on the Gave de Pau, at the confluence of the Soust and Ousse. It has grown up on the edge of a plateau overlooking the plain of Jurançon, and is divided into two parts by a small stream called the Hédes. The castle, which dates from the fourteenth century, and was built by Gaston Phœbus, contains fine tapestries and the actual cradle and room in which Henry IV. was born. A

statue of this king stands in the Place Royale, famous as a view-point for the Pyrenees. P. is noted for its wines, cloths, and hams, but its prosperity to-day depends on the many visitors that the mild winter climate attracts. There is a court of appeal and a court of assizes at P., besides other tribunals. Pop. 46,200.

Paul, St., the Apostle (c. 3-c. 67), the great apostle of the Gentiles, was b. at Tarsus in Cilicia. Though a Jew of the tribe of Benjamin, a Heb. sprung from Hebs., he was by birth a Rom. citizen, having inherited this privilege from his ancestors, upon one of whom it had been conferred. The year of his birth is uncertain, and the first mention of his name in the N.T. writings is in connection with the martyrdom of Stephen (A.D. 33). His Jewish name was Saul, the form Paul being used in the Gk. and Rom. world. It is highly improbable that there is any connection between this name and that of his first great Gentile convert Scerghus Paulus. Saul learned the art of tent-making, of which industry Tarsus was a local centre, for it was a custom among the Jews to instruct their youth, even of the highest respectability, in some mechanical art. He was educated in the learning of the times, and later went to Jerusalem to study the laws and traditions of his people under Gamaliel, a distinguished Rabbi. Being a man of great talent, ardent mind, and inflexible resolution, and being devotedly attached to the institutions of his country, he contemplated with alarm and anxiety the progress of the new religion. Accordingly he took an active and prominent part against the Christians, pursuing them with zeal and unrelenting fury. He obtained letters from the Sanhedrin to the synagogues of the Jews at Damascus, and also to the governor, authorising him to apprehend and bring to Jerusalem whomsoever of the disciples he might find there. While on this journey his miraculous conversion took place. The journeys and events of his laborious life up to his captivity in Rome are described in the Acts of the Apostles. He may subsequently have revisited the E. and Spain. P. suffered martyrdom at Rome c. A.D. 67.

The Canon of the N.T. assigns to P. the authorship of thirteen epistles, and the Rom. Catholic Church also attributes to him the Epistle to the Hebrews. Some of his speeches are recorded in the Acts. From these writings we learn that P. suffered from physical defect, the exact nature of which is unknown. But though weak in body he was a man of unflinching energy and of a bold and passionate nature.

Theology of Paul—The letters and speeches of P. which have come down to us were all directed to one purpose, the proof of Christ's claims to be the Messiah promised to the Fathers and the exposition of what these claims meant, with exhortations to the fulfilment of moral duties and advice as to the management of ecclcs. affairs. P.'s interpretation of the meaning of his Lord's work was accepted by the early Church, as may

be seen in 1 Peter, the Johannine writings and epistle to the Hebrews. It is difficult to formulate Pauline theology because we have to cull it not from treatises, but from occasional letters which only contained what bore on the question at issue. All that can be attempted is to sketch the system of P in its central ideas. To P as a Jew, righteousness with its converse sin is of primary import; this at first was purely external, but the Fifth Commandment led him to recognise the spirituality of the demands of the law (Rom vii 7). Over against this is his Christology. The crucifixion was the 'stumbling block' which hindered him from recognising Jesus as the Christ. When Jesus met him on the way to Damascus he was forced to recognise his Messiahship with this the problem assumed a new shape. The question 'Why had the Messiah died?' led to the idea of atonement. The wages of sin is death, but He had no sin. Hence I was led to look on His death as substitutionary. Death was wide as the race, therefore sin must also be universal, if so the origin of sin must be found in the origin of the race. In Adam I died. Jesus is the second Adam in whom 'all are made alive' (1 Cor xv 22), the result of the physical union to the first Adam is counterbalanced by spiritual union to Christ (1 Cor vi 17). All however do not benefit by the life-giving power of Christ's death, only those who believe. Those who believe will be received into glory at the coming of the Lord (1 Thess iv 15). With this is connected the Last Judgment and the resurrection (Acts xviii 31, 1 Tim ii 16). I did not look forward to the salvation of individuals only, and that in the present life; he also contemplated a regenerated society on earth. The Church, the assembly of all believers was the new Israel. From the old covenant he drew the idea of the conjugal symbol for the relation of the Church to her Lord (Eph v 12). The Church was to be a self-sufficing republic not going before civil tribunals (1 Cor vi 1-6). The psychology by which P explained conversion and the consciousness of sin after it as also inspiration and prophecy and the explanation he gives of the rise of Church orders are all subjects of study.

The works on St P are very numerous. See W. J. Conybeare and J. S. Howson, *The Life and Letters of St Paul* 1962; E. C. Bann, *Paul his Life and Work* 1833; O. Pfleiderer, *The Influence of the Apostle Paul on the Development of Christianity* 1885; A. Sabatier, *L'Apôtre Paul* (trans.) 1891; G. B. Stevens, *The Pauline Theology* 1892; A. B. Bruce, *St Paul's Conception of Christianity*, 1894; J. G. Machen, *Origin of Paul's Religion*, 1921; P. Prat, *Théologie de St Paul* (trans.), 1926, and *St Paul* (trans.), 1928; C. A. Scott, *Christianity according to St Paul*, 1927; A. Schweitzer, *Mysticism of Paul the Apostle*, 1931; C. H. Dodd, *The Mind of St Paul*, 1936; J. Marstein, *St Paul*, 1942, 1948, and R. Senocourt, *St Paul*, 1948.

Paul, the name of five popes

Paul I (757-67), a brother of Stephen II. With the help of Pepin, king of the Franks, he contained the opposition to the Lombards, but his pontificate was of little importance.

Paul II (1461-71) (Pietro Barbo), b at Venice 1417 or 1418, was hardly more important. He added greatly to the magnificence of the city of Rome. In 1470 he decreed the observance of the Jubilee every twenty five years.

Paul III (1534-49) (Alessandro Farnese), b at Cambrino 1468, belonged to a very noble family. He was a man of great learning and wealth unequalled in tact and diplomacy, but his early life was stained by great excesses. After his consecration much opposition was excited by the elevation to the cardinalate of his two young grandsons aged fourteen and sixteen respectively. He convoked the Council of Trent which assembled in 1545 and approved the foundation of the Jesuit Society.

Paul IV (1555-6) (Giovanni Pietro Carafa), b at Capri 1501, came also of an illustrious family. His early life had been most ascetic and he was one of the founders of the order of Minors. His pontificate was marked by many reforms though when elected he was already seventy nine years of age. His diplomatic ability was less marked as was shown by his relations with England and Cardinal de Lorraine.

Paul V (1600-21) (Camillo Borghese), b at Rome, 1555, had been specially trained in jurisprudence and his excellence as a canonist is shown in the course of his pontificate. He was a strict disciplinarian and his excommunication of the English publican produced a schism which lasted a year. He did much for the city of Rome itself.

See I. Hayward, *History of the Popes*, 1929, Eng. trans. 1931.

Paul I (1754-1801) emperor of Russia, second son of Peter III and the Empress Catherine II. He became her apparent in 1763 and succeeded his mother in 1796. He was unfitted for his position by his violent temper and weak intellect and his impetuous actions caused much trouble. Among his earliest measures were the exile of his father's murderers and the pardon of Polish prisoners. He was a keen supporter of monarchy, declared for the allies against France, and in 1798 sent 50,000 men under Suvorov and another force under Korsakov to assist the Austrians in Italy. In 1799 he made a treaty with Great Britain, but in 1800 violated it by entering into the Napoleonic coalition resolved by Nelson's fleet in the battle of 1801. P was compelled to abdicate and was strangled in a struggle. See F. Golovkin, *La Cour de la régence de Paul Ier*, 1905.

Paul-Boncour, Joseph (b. 1873). French politician and statesman b at St Aignan-sur-Cher. After a brilliant career at the university he was called to the Paris Bar. In 1900 he pub. *Le Fédéralisme économique*. His sympathies were of the left and he

was an advocate of trade unionism. In 1906 he was elected to the Chamber as an Independent Socialist for the dist. of Loire-et-Cher. In 1911 he became Labour minister in the Radical Monis-Bortaux Cabinet. During the First World War he held a command in Lorraine and after it he joined the Socialist party. He was returned to the Chamber in 1919 and joined forces with Léon Blum; he was returned again in 1924 for the dist. of Tarn. He was a prominent member of the trade delegation to the League of Nations and took part in the discussions on disarmament. He resigned from the League of Nations in 1928 and was Prime Minister for the short period of Dec. 1932-Jan. 1933, when his gov. fell over a minor financial question. Under the leadership of Blum he was in 1933, and again in 1938, minister for foreign affairs when his policy was to secure collective security in Europe. In this his policy towards Spain and Italy (as regards Abyssinia) did not find favour with Great Britain.

Paul, Canons of St., see BARNABITES.

Paul, Father (Paolo Sarpi) (1552-1623), Venetian patriot and ecclesiastic, is important chiefly for his place in the contest between the city of Venice and the papal see during the pontificate of Paul V. He carried on a vigorous controversy with Bellarmine as to the papal prerogatives, and his activity was only ended by an attempted assassination in 1607, in which he was severely wounded. His most important literary work is a highly tendentious *History of the Council of Trent*.

Paul, Jean, see RICHTER, JOHANN PAUL FRIEDRICH.

Paul, Vincent de, see VINCENT DE PAUL.

Paula, see FRANCESCO DI PAOLA.

Paulding, James Kirke (1779-1860), Amer. author, b. at Pleasant Valley, New York. Self-educated and early developing a tendency to literature, he was a friend of Washington Irving, and wrote a portion of *Salmagundi*. During the war of 1812 he pub. the *Dwelling History of John Bull and Brother Jonathan*; in 1813 a parody of the *Lay of the Last Minstrel*, entitled *A Lay of the Scottish Minstrel*; and in 1814 a more serious work, *The United States and England*, a defence against articles in the *Quarterly Review*. This work attracted to him the attention of President Madison, and caused him to be appointed a member of the Board of Naval Commissioners. In 1817 he pub. a defence of the S. states and of slavery in *Letters from the South, by a Northern Man*. His numerous other works include *Königsmarke*, a novel (1825), *Merry Tales of the Three Wise Men of Gotham* (1826); *The New Pilgrim's Progress* (1828); *Tales of a Good Woman* (1829); *Book of St. Nicholas* (1830); *The Dutchman's Fireside* (1831). These were followed by a *Life of Washington* (1835) and *Slavery in the United States* (1838), in which the institution is defended on social, economical, and physiological grounds. Later he was appointed secretary of the navy, which gave him the position of cabinet minister.

Pauli, George Reinhold (1823-82), Ger. historian, b. in Berlin; spent a year at Oxford and travelled in other parts of England and in Scotland before he became private secretary to Baron von Bunsen, the Prussian ambas. in London (1849-52). He held the chair of hist. successively at Rostock (1857-59), Tübingen (1859-60), Marburg (1867-70), and Göttingen (1870-1882). His genial and erudite vols. written in continuation of Lappenberg's *Geschichte von England* give a vivid and truthful picture of this country in the Middle Ages, whilst he also wrote monographs on King Alfred (1851) and Simon de Montfort (1867), and a *Geschichte Englands* between the years 1811 and 1852 (1864-75).

Pauli, Wolfgang (b. 1900), Swiss physicist (b. in Vienna), of the Federal Technical High School at Zurich. He went to Princeton as a disciple of Sommerfeld. As a student he wrote the article 'Theory of Relativity' for the *Mathematical Encyclopaedia*, still one of the best presentations of the subject. He played a large part in Niels Bohr's interpretation of atomic spectra in terms of quantum theory, and made further discoveries in the quantum theory, which served Bohr as the main factor in his explanation of the periodic system of the elements. P. also had a share in the development of matrix mechanics. In 1945 he was awarded the Nobel prize for physics. He has pub. papers on nuclear physics, equilibrium of radiation and molecules, entropy in quantum statistics, and similar subjects.

Paulicians, heretical sect which arose in Syria and the E. during the seventh century, and whose beliefs were a blend of Manichæism and Gnosticism. The name is generally said to be derived from the apostle Paul, for whose writings the sect had an especial veneration. The sect appears to have been founded by Constantine of Mananalis, near Samosata, a little before 660. The P., who themselves refused to accept any title but 'Christians,' underwent severe persecutions from the E. emperors, and they are said finally to have died out in the reign of Alexis Comnenus. The Bogomiles, Cathari, Albigenses, etc., are their spiritual descendants, and in Armenia P. communities continued till recent years. See G. A. Scott, article 'Paulicians' in Hastings's *Encyclopaedia of Religion and Ethics* (vol. ix.), and O. C. A. Harnack, *History of Dogma* (vol. ii.), trans. 1895-96.

Paulinus, St. (d. 641), archbishop of York. A Rom. by birth, he became a monk and was sent out in 601 by Gregory the Great as auxiliary to St. Augustine. He laboured as a missionary first in Kent and then in Northumbria, whither he had accompanied Ethelburga, sister of the Kentish king, Eadbald, on her marriage with King Edwin. He is described by Bede in Book II. of the *Historia Ecclesiastica*.

Paulinus, Gaius Suetonius, Rom. governor of Britain during A.D. 59-62. He subdued the rebellious Iceni and defeated Boadicea (q.v.) in 61. In 66 he became

a consul, and in 69 was a general in Otho's wars against Vitellius.

Paulinus of Nola (c. 354-431), priest and poet, b. at Bordeaux, son of the Rom. praetorian prefect in Gaul. Prefect of Rome for a time, he went to Spain, became a priest, and later bishop of Nola in 410. Some of his letters, and most of his poems are extant, showing fluency and high quality of writing.

Paul of Samosata (fl. third century A.D.), heretical teacher, b. at Samosata, and about 260 became bishop of Antioch, where he also acted as viceregent to Zenobia, the queen of Palmyra. He taught the Monarchian heresy that God is one, and that the Trinity is only a name for the three forms in which God has expressed Himself. In 264 Paul's teachings were condemned at the Council of Antioch, and five years later he was deposed. But he was supported by Zenobia, and continued to retain his position until the city was taken by the Emperor Aurelian in 272. Followers of P. of S. existed as late as the fourth century. See C. G. A. Harnack, *History of Dogma* (vol. iii.), 1894.

Paul the Deacon (Paulus Diaconus, known also as Varnfridus) (c. 720-801), a Lombard, b. in Friuli, who became a monk in the monastery of Monte Cassino. He wrote *Historia gentis Langobardorum Libri VI.*, dealing with the period from 568 to 744, as well as other works of importance in the hist. of monasticism. His *Historia romana* is a sequel to the *Breriarum* of Eutropius.

Paulus, family of the Æmilian clan at auct. Rome. The chief members were:

Lucius Æmilius P., Rom. consul in 219 B.C. and in 216 B.C. During his second consulate he was persuaded, contrary to his wish, by his colleague Terentius Varro, to fight the battle of Cannae against Hannibal, and fell.

Lucius Æmilius P., surnamed *Macedonicus* (c. 229-160 B.C.), son of the preceding. He was re-elected consul in 168 B.C., and was entrusted with the command in the Macedonian war, defeating Perseus at the battle of Pydna. He became censor in 164. His son, *Publius Scipio Africanus the Younger*, was adopted into the family of the Scipios. See Plutarch's *Lives*, 'Æmilii Paulus.'

Paulus Ægineta (fl. seventh century A.D.), Gk. physician, b. in Ægina. He was connected with the medical school of Alexandria. He was particularly skilled in surgery in the branch of obstetrics. His chief pub., *Synopsis of the Medical Art*, went through numerous eds. and trans. (see Eng. trans. by F. Adams, 1844-48).

Paulus Julius (fl. third century A.D.), distinguished Rom. lawyer, of the circumstances of whose birth little is known. He acted as jurist in the reigns of Septimius Severus and Antoninus Caracalla. He was a prolific writer, his chief work being *Ad Edictum* in 80 books. He handled a variety of subjects, and was one of the greatest legal writers of auct. times.

Paul Veronese, see VERONESE, PAUL.

Pauncefote of Preston, Julian, Baron (1828-1902), Eng. diplomat, b. at Munich. In 1865 he became attorney-general, and nine years later was appointed chief justice of the Leeward Is. In 1889 he was appointed minister to the U.S.A., and was made first ambas. to the U.S.A. in 1893. He negotiated a general arbitration treaty between Great Britain and the U.S.A., and his diplomatic ability did much to further cordial relations between these countries.

Paupers, see under MENDICANCY; POOR LAWS; VAGRANTS.

Pausanias (fl. fifth century B.C.), Spartan general, son of Cleombrotus and nephew of Leonidas. In 479 B.C. the Spartans allied with the Athenians against the Persians, and placed P. in command. At the great battle of Plataea the Persian forces were routed, and P. is said to have acquitted himself with great valour. He continued the war against Persia in 478, and aimed at becoming tyrant over the whole of Greece. To bring this about it was necessary to gain the support of the Persian king, and he conducted a treasonable correspondence with Xerxes. His perfidy was discovered, and he was starved to death as a punishment, by order of the ephors.

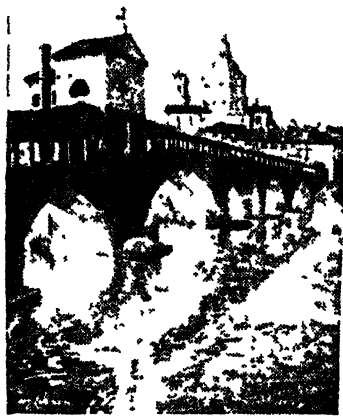
Pausanias (fl. second century A.D.), celebrated Gk. traveller and geographer, probably a native of Lydia, and there is evidence to show that he had lived long near Mt. Sipylus. Of his personal hist., however, little is known, but passages in his great work, a *Periegesis or Itinerary of Greece*, prove him to have been a contemporary of Hadrian and the Antonines. This work is in ten books and contains a description of Attica and Megaris (book i.), Corinthia, Sicyonia, Phliasia, and Argolis (ii.), Laconica (iii.), Messenia (iv.), Elis (v. and vi.), Achæa (vii.), Arcadia (viii.), Boeotia (ix.), and Phocis (x.). It is full of mythological, historical, and artistic matter, and with the exception of Herodotus there is no writer of antiquity who has collected so many valuable facts in so small a vol. The latest ed. of P. is by H. Hitzig and H. Blumer (1896-1910). Eng. trans. by Sir J. G. Frazer, 1898, 1913. See also Sir J. G. Frazer, *Pausanias and other Greek Sketches*, 1900.

Pavetta, dwarf shrub with white flowers and ornamental leaves, cultivated in greenhouses. The best-known species is *P. cafra*, 3 to 4 ft. high.

Pavia: 1. Prov. of Lombardy, Italy, watered by the Po and its tribs., the Sesia, Ticino, Olona, and Trebbia. There are numerous canals, the most important one connecting the Ticino and the Olona (20 m.). It is mainly a level, fertile plain, but the S. is mountainous. Silk, cheese, cattle, rice and cereals, chestnuts, fruit, and wine are the chief products. Area 1287 sq. m. Pop. 500,000. 2. (Auct. Tolemiun.) (cap. of the above, on the r. b. of the Ticino, 18 m. S. of Milan. The riv. was crossed by a magnificent granite bridge of seven arches (1353), unfortunately destroyed in the Second World War, and an iron railway bridge (1865). The city is still surrounded by its old

walls, and among its interesting buildings are the cathedral, begun in 1468 but not completed until 1898, and the church of San Michele, in which the old 'kings of Italy' were crowned. The 'Certosa di Pavia,' founded in 1396, is 5 m. N. of the tn. The univ., said to have been founded by Charlemagne in 774, but estab. as a univ. by Galeazzo Visconti in 1361, was a famous seat of learning in the Middle Ages. The Palazzo Malasпина contains a museum of antiquities and a collection of paintings and engravings. The Collegio Borromeo was founded in 1563.

P. has manufs. of no great importance and a trade in such local products as



The covered bridge over the Tino destroyed in the Second World War

wine, olive oil, silk, corn, hemp, and cheese. There are important marble-works. P. was founded by the Ligurii, and became a place of great importance. Charlemagne took it from the Lombards in 774. In 924 the tn was destroyed by the Hungarians. It was the scene of church councils in 1081, 1160, and 1423. In 1359 it was taken by the Visconti of Milan. At P., in 1525, Charles V. defeated the Fr. and captured Francis I. It was annexed by Austria in 1714, pillaged by Napoleon in 1796, and joined to Italy in 1859. Pop. 56,100.

Pavia y Albuquerque, Jose Manuel (1828-95), Sp. statesman. *b.* at Cadiz. He took part in the revolutionary movements of 1866 and 1868, and commanded the Federalists against the Carlists. He retired into private life in 1874.

Pavlitza, *see* PHIGALIA.

Pavlodar, Region of the Kazakh S.S.R., Russian Central Asia.

Pavlograd, tn. in the Dniepropetrovsk

Region of the Ukrainian S.S.R., 40 m. E. of Dniepropetrovsk, on the R. Voltoha. Trade in cattle and grain is carried on, and there are manufs. of tobacco, bricks, and flour. Pop. 50,000.

Pavlov, Ivan Petrovich (1849-1936), Russian physiologist, *b.* at Ryazan, son of a vil. priest and educated first at a theological seminary and then in St. Petersburg, in general science at the univ. and in medicine at the Military Academy. In 1891 he was made director of the physiological dept. of the newly estab. Institute of Experimental Medicine, in 1897 prof. of physiology at the Military Academy; and in 1907 one of the four scientific members of the St. Petersburg Academy. His earliest important work was on the physiology of circulation. His next was on digestion, involving researches on conditioned reflexes, and, through them, on animal psychology. These researches reformed all ideas of the processes of digestion and were the foundation of modern knowledge of the subject. Subsequently he began to study the higher nervous activity of man, using individuals with functionally and automatically diseased brains. On his eighty-fifth birthday the Soviet Gov., which he was always criticising, gave him a large sum for the extension of his laboratories and a pension of 20,000 roubles. He won the Nobel prize in medicine in 1904 and received the Copley Medal of the Royal Society in 1915. *See also* BEHAVIOURISM, CONDITIONED REFLEXES.

Pavlova, Anna (1885-1931), famous Russian ballerina, *b.* at St. Petersburg. At the age of ten she entered the state-endowed Imperial Ballet School attached to the Marianski Theatre in St. Petersburg where later, having passed rapidly through all its grades, she became prima ballerina. She came to London in 1910, having already been to Berlin, New York, Vienna, and Paris, where she brought the revelation of a perfect art. With her then was the male dancer, Michael Mordkin, and among her famous ballets were 'Les Papillons,' 'Valse Caprice,' and 'The Swan' of Saint-Saëns, which last-named remains in the popular mind as her supreme achievement. In Paris, with Diaghilev's ballet, she danced in 'Les Sylphides,' 'Pavillon d'Armide,' and 'La Nuit égyptienne.' With Novikov she danced in interpretations of Chopin's music, revealing a technical mastery in creations of rare beauty. She appeared with regularity in London, and in 1923, 1924 and 1925 she gave seasons of ballet at Covent Garden with her own company. In 1926 she made what was almost a triumphal progress through S. Africa, Australia, and New Zealand. She subsequently settled in London, where for some years she conducted a dancing academy. P. is an historical figure in the evolution of the dance. Before her ascendancy, the traditional technique of ballet dancing had been perfected. It had become, however, with its *pointes* and *entrechat*, an end in itself, but, as against the ultra-artificiality of these performances, P. brought ballet dancing back

to nature and, paradoxically enough, by way of its traditional technique, and besides being unique in personality she was a supreme artist in that kind. See V. Svetlopp, *Anna Pavlova: a Choreographic Portrait*, 1929, and W. Hyden (her husband), *The Genius of the Dance*, 1931.



ANNA PAVLOVA

L. N. J.

Pavlovo, tn. in the Gorky Region of the R.S.F.S.R., on the Oku, 12 m. S. of Gorbato. It is an important industrial centre, producing cutlery, hardware, steel goods, etc. Pop. 20,000.

Pavonia, genus of Malvaceae, small shrubs or herbs found in tropical America and Asia. *P. odorata* is cultivated in Indian and Burmese gardens for its fragrant flowers. It is grown in Britain as a greenhouse plant, the chief species being *P. intermedia*, a hybrid with white flowers, *P. kermesina*, a dwarf hybrid with white flowers, and *P. multiflora*, 1 to 2 ft. high, with purple flowers.

Pavonidae, see *Peacocks*.

Pawnbroker. By the Pawnbrokers Act, 1922, a P. is defined as a person who keeps a shop and purchases or takes in goods, paying or lending thereon any

sum not exceeding £10 under an agreement, express or reasonably to be implied, that the goods may be afterwards repurchased or redeemed. A P. may not act without a licence from the Inland Revenue Commissioners, the penalty for so acting being £50. Such licence, the duty on which is 27 10s., can only be obtained on production of a certificate from a magistrate. For dealing in silver a plate licence (£5 15s.) is required, and a moneylender's licence (£15) if the P. wishes to advance more than £10. Magistrates must grant certificates to applicants within their jurisdiction unless the applicant is of bad character or his shop or any adjacent premises owned by him are frequented by persons of bad character. Twenty-one days' notice of an intended application must be given by registered letter to the dist. superintendent of police, and twenty-eight days prior to application a notice must be affixed for two consecutive Sundays on some church door, or, if there be none, some conspicuous public place. Pledges must be redeemed within twelve calendar months from (and exclusive of) the day of pawning (with an additional seven days' grace). Pledges for 10s. or under if not redeemed become the P.'s absolute property. Pledges for more than 10s. must be sold by auction, and any P. may purchase at the sale. A P. must not take goods if the pawner refuses to take a ticket. If the pawner has lost his ticket or had it stolen or destroyed he must get from the P. a form of the declaration to be made before a magistrate with respect to the missing ticket. Both the pawner and some person who can identify him as the owner of the goods or as the person entitled to hold the lost ticket must make the declaration. The form of declaration when completed and delivered back to the P. operates to put the declarant in the same position as if he had produced the ticket, and the P., unless he knows the declaration to be false, will then incur no liability for delivering the goods to him. If a pledge be destroyed or damaged by fire, the P. must pay within the redeemable period the value of the pledge less loan and profit; the value is taken to be the amount of the loan plus profit plus 25 per cent. on the amount of the loan. For the ticket of goods pledged for 10s. or less the P. is entitled to charge 1d. and an additional charge of 1d. for each 5s. or part of 5s. lent; loans above 10s. and not exceeding £2, 1d. for the ticket and the same rate of profit as above, for loans above £2, the profit of 1d. per month is reckoned on each 2s. 6d. or part of 2s. 6d., unless a special contract is made and a special ticket given in accordance with the prescribed form under the Act of 1922. A P. may not, without rendering himself liable to a penalty of £10, receive a pledge from any person appearing to be under fourteen (in London, under sixteen) or intoxicated. A P. who takes stolen goods may find himself ordered by a magistrate to restore them to the true owner if the pawner be convicted; but the magistrate will ordinarily consider the conduct both

of the P. and the owner in making any order. It is provided by the Firearms Act (1937) that a P. may not take in pawn firearms or ammunition of certificated dealers. The Liability for War Damage Act, 1939, provides, in the case of loss or damage of a pledge by fire due to war, that the P. is not liable to make any payment and, unless the pawner redeems the pledge he is not liable to repay the loan. This provision applies only to pledges on which a loan of £10 or less has been made. Before 1939 there were 2700 Ps. in Britain; in 1949 the number had declined to 1800, including 150 in London. See also MONT DE PIÉRE. See L. P. Stubbs, *Guide*, 1866; A. Hardaker, *Brief History of Pawnbroking*, 1892; L. Lallemant, *Histoire de la charité*, 1912.

Pawnees, tribe of N. Amer. Indians, formerly living on the Platte R. in Nebraska, and in Kansas and Texas. They were a brave, warlike tribe, and their hist. is one of continual strife with their neighbours. They lived in log huts and supported themselves on the produce of their fields during the winter months, and the remainder of the year hunted the buffalo on the plains. Their vil. was burnt by the Delawares in 1823, and ten years later they ceded all their ter. S. of the Platte, surrendering all the remaining land, save a small part on the Loup R., in 1853. In 1874 they removed to the Indian reservation of Oklahoma, where they now number about 600. See G. B. Grinnell's *Pawnee Hero Stories and Folk-tales*, 1893; F. Denmore, *Pawnee Music*, 1929; and W. R. Wedel, *Louise Archaeology*, 1936.

Pawpaw (*Asimina triloba*), tree of the family Anonaceae, indigenous to N. America, but now widely cultivated in the tropics, yielding a fruit the size of a melon, edible when boiled, whose juice renders tough meat tender.

Pawtucket, city of Providence co., Rhode Is. U.S.A. 4 m. N. of Providence, and near the city of Central Falls. It lies on both sides of P. R. which is navigable below the falls and covers an area of about 10 sq. m. The chief industries are the manuf. of textile cottons, silks, braids, hosiery, etc., the first U.S. cotton factory being estab. here in 1790. Pop. 75,800.

Paxo, smallest of the seven chief Ionian Is., 10 m. S.E. of Cephal. Its total length is 5 m. and breadth 2 m. The surface is mountainous and it produces oil and fruits. Cap. Porto Javo (Lao), on the E. coast. Pop. of 4000.

Paxton, Sir Joseph (1801-65), Eng. gardener and architect, b. at Milton Bryant, Bedfordshire. While serving as a gardener, attracted the attention of the duke of Devonshire, who in 1826 appointed him superintendent of the gardens at Chatsworth. He designed the building for the great exhibition of 1851, and two years later removed the glass and iron structure to Hydenham, where it was called the Crystal Palace. He represented Coventry in Parliament from 1854 until his death. He wrote sev. horticultural works, including *A Botanical Dictionary of all Plants known in Britain* (1868).

Pax Romana, abstention from war enforced on states subject to the Rom. Empire. The orderly administration of justice and the universal peace, which the Rom. Empire estab. from the Atlantic to the Euphrates, did not, however, long survive the inroads of the Teutonic tribes who in W. Europe apportioned the inheritance of the Lat. *orbis terrarum* between them. Rom. power had become weakened by Julius Caesar's time, but the Gallic conquest added to the ageing body of the Rom. state a limb which contributed largely to the renewal of its youth; for Caesar himself laid the foundation of his monarchical power, and in the world's hist. it played a part of incomparable importance simply by the fact that the current of the Germanic invasion into the Rom. Empire was thereby dammed at a time when the Germanic world could have shattered Rom. and, with it, classical civilisation, but could not have absorbed it.

Augustus gave Rome fifty years of peace and good government, and he estab. a form of empire which was destined to endure for many years. But all the early Teutonic codes being based, however remotely, on the right of private war and private vengeance, might deteriorate but could not eradicate the instinct which urges the members of semi-civilised communities to avenge their own wrongs. Hence the P. R. died with the empire, and the able organisation of Charlemagne could effect no more in the W. half of the empire than a very partial reconstitution (see also under JON'S TRUCE). Pax Britannica has the same connotation in relation to the Brit. Empire (q.v.).

Pax Romana, name of a Rom. Catholic organisation devoted to the maintaining of contacts between univ. students and promoting moral and social welfare through their influence. It was founded in 1921 by students and undergraduates of eighteen nations at Fribourg in Switzerland. Since then it has grown to world-wide extension by affiliating existing organisations. In 1946 it was divided into a senior or graduate branch and a junior branch. In England the Newman Association and the Union of Catholic Students are respectively the senior and junior Brit. constituents of these branches.

Pay As You Earn, see under INCOME TAX.

Payenne (anct. Paterniacum), tn. of Switzerland, 10 m. W. of Fribourg, in the canton Vaud. Pop. 5000.

Paymaster, in navy, see PURSER.
Paymaster-General. The office of P.-G. was reorganised in 1816, the various offices of paymaster of the army, navy, ordnance, and civil service being by that act consolidated into one office. To this office are now paid all the public moneys due for the army, navy, and civil services. The issue of money for the Consolidated Fund service is made by Treasury requisition to the comptroller and auditor-general; and when the latter, being satisfied that the requisition complies with Acts governing the proposed expenditure, makes the necessary order, the Treasury

directs the Bank of England to transfer the sums required from the Exchequer account to that of the P.-G. Similarly requisitions for credit are made by directions from the Treasury to the bank to transfer the sums specified to the 'supply account' of the P.-G. The depts. concerned are then informed that the sums voted by Parliament are placed to their respective accounts with the P.-G., and from that moment they become responsible for its disbursement in accordance with the votes. The office is unpaid. See Sir W. R. Anson, *Law and Custom of the Constitution*, 1886-92.

Payn, James (1830-98), Eng. novelist, b. at Cheltenham, began his literary career when, as a Cambridge undergraduate, he pub. in 1852 two vols. of verse. He then became a contributor to *Chambers's Journal*, of which he was editor from 1859 to 1874. From 1853 he was editor of the *Cornhill Magazine* until within two years of his death. His first novel, *The Foster Brothers*, appeared in 1859, and had some scores of successors, including *Lost Sir Maesingberd* (1861); *Walter's Word* (1875); *By Proxy* (1878); *The Canon's Ward* (1884), and *The Tale of the Town* (1885). Most of P.'s stories are sensational or have an element of mystery in them, and, though the chain of coincidence is often strained, the plots are usually ingenious and well worked out.

Payne, John Howard (1791-1852), Amer. actor and dramatist, b. in New York. His first appearance on the stage was in Home's *Douglas*, in which he at once achieved success. In 1813 he appeared in London and estab. himself in England and had a successful career both as actor and author for upwards of thirty years. He wrote *Clari, or the Maid of Milan* (1823), containing the well-known song, *Home, Sweet Home*; *Charles II.* (1824); *Procrastination*, and others, and adapted plays from the Fr. See G. Harrison, *The Life and Writings of John Howard Payne*, 1885, and W. T. Hanson, *The Early Life of John Howard Payne*, 1913.

Paysandu, dept. of Uruguay, S. America, with an area of 5115 sq. m. and an important cattle industry. Wine is produced and the dept. is rich in minerals. The tn. of P., on the Uruguay R., is the cap. of the dept. of P. and the second city in the republic. There are large slaughter-houses, and tinned meat and tongue are exported. P. is the centre of the meat-preserving industry. Other activities are breweries, distilleries, tanneries, sugar refineries, shoe and soap factories. P. is the headquarters of the Midland Railway. The city is being modernised. By rail it is 300 m. from Montevideo. Pop. (dept.) 84,200; (city) 50,000.

Pazand, or Avesta, see under *PERSIAN, Language and Literature*.

Paz, La, see *LA PAZ*.

Paz Soldan, Mariano Felipe (1821-86), Peruvian historian and geographer, b. at Arequipa; studied and later practised law there and at Lima, in 1860 he became director of public works. He wrote *Atlas Geografico del Peru* (1861); *Historia*

del Peru independiente (1866); *Diccionario Geografico estadistico del Peru* (1877); and *Historia de la Guerra del Pacifico* (1884).

Pea. Two species of *Ps.* are cultivated in Britain, and of both there are a large number of varieties. The garden P. (*Pisum sativum*) is not known to exist in a wild state; its flowers are white, and its seeds are yellowish-white or bluish-green. They are gathered unripe and eaten as green *Ps.*, one of the most nutritious and popular vegetables. The earliest crops are raised from seeds of forcing varieties sown in gentle heat in Dec. The earliest outdoor plants are raised from seed sown under glass in Feb. and planted out in



PEA
A garden pea; B, sugar pea

March or April. The field P. (*Pisum arvense*) has purplish flowers, and is harder than the garden P. It is, however, a very uncertain farm crop, doing best on light land rich in lime; it follows barley in a rotation. The dry straw or haulm averages about a ton per acre, and is used as fodder. The variety known as the sugar P. has an edible pod.

Peabody, George Foster (1795-1869), Amer. philanthropist, b. at Danvers (later Peabody), Massachusetts; but having amassed a fortune as a dry goods merchant, he settled in England in 1837, where he continued in business. He gave largely to educational institutions, and was a lavish donor to Harvard and Yale. He is principally remembered in England for his gifts to the London poor, amounting in all to half a million sterling. Out of this sum were built the 'P. Dwellings,' the first of which was opened in Spitalfields, in 1864. A retiring man, he declined a baronetcy and the G.C.B. In 1866 he estab. a museum of archaeology and ethnology at Harvard and of natural hist. at Yale. In 1940 there was estab. in his memory Radio Awards for meritorious service by broadcasters.

Peabody, city of Massachusetts, U.S.A., in Essex co., 17 m. N.E. of Boston, with leather industries. Formerly S. Danvers,

in 1868 it was renamed after George Peabody (*q.v.*), who was a native. Pop. 21,700.

Peace, Albert Lister (1844-1912), musical composer, *b.* at Huddersfield, and commenced his career at the early age of nine years, when he was organist of Holmfirth par. church. In 1875 he was doctor of music at Oxford Univ. His compositions are extremely difficult—quite beyond the range of the ordinary organist—and include a setting of Psalm cxxxviii., a cantata, 'St. John the Baptist,' numerous anthems, services, etc.

Peace, Charles (1832-79), Brit. criminal, *b.* at Sheffield, where he received his first sentence for robbery in 1851. Before his execution at Leeds on Feb. 25, 1879, for the murder of Arthur Dyson on Nov. 29, 1876, he confessed to many burglaries and to the murder of a policeman at Manchester in 1876.

Peace Ballot, unofficial referendum on the subject of peace or war sponsored by the League of Nations Union in 1935 to test public opinion on four specific questions, the public being asked to reply 'Yes' or 'No' to each: whether they were in favour (1) of the League of Nations; (2) of all-round disarmament; (3) of the private manuf. of arms; and (4) (a) of economic and (b) military action against an aggressor nation. The total papers returned was 11,640,066, and exceeded the most sanguine expectations of the organisers. The vast majority of the answers to most of the questions were in the affirmative, the largest number of negative answers being to question (4) (b) 2,366,184, and to question (3). The moving spirit in the ballot was Lord Robert Cecil (*q.v.*). The announcement came at an opportune moment, for Brit. attachment to the ideals of the League of Nations was soon to be put to the test over the Italo-Abyssinian crisis.

Peace, Breach of, *see* BREACH.

Peace, Clerk of the. This Eng. functionary is clerk to the co. council and is appointed by a joint committee of quarter sessions and the co. council. He is not salaried, but is paid fees for his various duties. He keeps the records of quarter sessions, issues precepts to overseers for the collection of rates, attends either personally or by deputy the justices in quarter sessions and advises them on the law relating to cases before them, and receives and takes custody of the quarterly returns of deaths from the local registrars of births, deaths, and marriages. A C. of the P. is generally by profession a solicitor, like a tn. clerk of a bor. He cannot sit in parliament, as he is bound to devote all his time to his official duties. Formerly voters' lists were dealt with by the C. of the P. through the overseers, but, since the Local Government Act of 1925, these duties were transferred to the registration officer, who is usually the tn. clerk.

Peace, Commission of, *see* JUSTICES OF THE PEACE.

Peace Conference. For P. Cs. before the First World War, *see* HAGUE CONFERENCE. For P. Cs. after the First World

War, *see* PEACE CONFERENCE (1919); LOCARNO CONFERENCE AND TREATIES; also COVENANT OF THE LEAGUE OF NATIONS.

Peace Conference (1919), assembled on Jan. 18, 1919, in Paris. There were seventy delegates representing thirty states. Great Britain, the U.S.A., France, Italy, and Japan sent five delegates each; Belgium, Brazil, and Serbia three each, and the remainder two or one. After the formal opening, the conference sat but rarely, its sessions being largely ceremonial. The actual work was carried on by special committees, which discussed such individual topics as the 'league of nations,' 'reparations,' 'war responsibility,' 'labour legislation,' etc. The committees sat *in camera* and only such reports as were approved by the spokesmen of the Great Powers were submitted to the plenary conference. Originally there was a Council of Ten, constituting the Supreme Council; this was reduced to five and then, after Japan dropped out, to four—Wilson, President of the U.S.A., Clemenceau, Lloyd George, and Orlando of Italy. Then Italy withdrew over the Fiume question and the council was reduced to the 'Big Three.' Differences of outlook were hard to reconcile. Wilson's main preoccupation was with his project for a league of nations (*see* also FOURTEEN POINTS), while Great Britain was concerned chiefly with the supremacy of the seas and the control, through the mandatory system, of the Ger. colonies. The principle of self-determination proved a thorn in the settlement of boundary disputes, notably as between the Balkan states, Poland and the Ukraine, the Poles and the Czechoslovaks, and Italy and Yugoslavia. France held strong views on her rights to economic privileges in Germany and special political and financial privileges in the Saar valley. A proposed defensive alliance between Great Britain, France, and the U.S.A., contrary to the earlier pronouncements against alliances within the league, was also one of the causes of delay. In the result, President Wilson, rather than incur possible opposition to his League of Nations, gave way on such of the above questions as were really opposed to his ideals; but even though the lt. delegates acceded for a time, he refused to yield to the lt. demand for the cession of ter. guaranteed to Serbia by various secret treaties. Difficulties also arose over a territorial settlement in the Pacific, owing to the traditional conflict of interests between Australia and New Zealand on the one hand, and Japan on the other. But after some four months of deliberations, the allied diplomatists submitted the draft of the proposed treaty with Germany to the Council, and this draft was accepted by the P. C. in plenary session on May 6. On May 7, the P. C. having become the Peace Congress, at which Germany was to be represented, the draft was handed to Count Brockdorff-Rantzau, the foreign secretary of the Ger. republic, at Versailles, and accepted, though only after protests and

a political crisis in Germany, unconditionally on June 23, the last day of grace. After the treaty was ratified, further conferences were held at San Remo, The Hague, and Spa in April, May, and June 1920 respectively, to discuss reparations, disarmament, mandates, and the Adriatic question. For Peace Conference with Turkey see under LAUSANNE.

Sequel to the Peace Settlement of 1919-1920.—The peace settlement of 1919-20 was ill calculated to promote peace even for a limited period. The new co-operative system embodied in the League of Nations was stultified from the start by the defection of its protagonist's (Wilson's) country and by the fact that it was not sustained by the organised opinion of the nations as a whole. There were grave inherent imperfections in the treaty of Versailles, not the least of which was the lack of large-scale economic planning. The severity of the treaty struck the weak Weimar Republic a mortal blow, for in Ger. opinion it identified democracy with humiliation. Moreover the Fr., under the lead of Clemenceau, were dissatisfied with the peace settlement which, in their view, afforded them no real security because of the Anglo-Amér. veto on the separation of the l. b. of the Rhine and on the Fr. annexation of the Saar. France, too, regarded the League of Nations as an Anglo-Amér. creation and therefore reposed no confidence in its practical utility in time of need. The League membership seemed to show that the body was merely a perpetuation of the victorious allied and associated powers (minus America), involving the sharp div. of Europe between the satiated and the hungry, or the 'Haves' and the 'Have-nots.' As a fully satisfied power it was natural for the Brit. Empire to welcome the experiment of the League and its Covenant as a stabilising influence in the world offering, through the machinery of collective security, a way of escape from nineteenth-century isolationism on the one hand and, on the other, from provocative alliances like the Anglo-Fr. *entente* and the Brit. alliance with Japan. Thus the 'peace settlement' contained the seeds of a new conflict and the peace was lost as soon as the military victory was won. It has been said with truth that there were only two ways of averting another contest: the first was the path of reconciliation implicit in the Fourteen Points (q.v.) and outlined in Lloyd George's memorandum of March 25, 1919; the rival policy, favoured by most Frenchmen, consisted in depriving Germany of the means of aggression. The first would have involved admitting Germany to the League of Nations soon after the foundation of that body, fixing reparations (q.v.) at an amount capable of being paid within a generation, the fulfilment of Article VIII. of the covenant concerning disarmament, and the return of some colonial ter. under mandate. During the Locarno quinquennium it seemed as if France were converted to the policy of reconciliation, but the change was only

superficial. Locarno was a failure, not necessarily because it was based on unsound principles, but because it was not implemented by larger measures of conciliation. The Locarno treaties, though they had their origin in Germany, were never more than an illusion, for Russia necessarily looked upon them as a one-way arrangement designed to stabilize the W. while leaving the E. open to Ger. attack. Throughout the two decades between the two world wars the theory of the balance of power was never abandoned and, rightly or wrongly, Germany regarded the Franco-Russian Treaty of 1933 as a violation of the Locarno settlement. Briand's scheme for a European federation, outlined at the League Assembly of 1929, provoked much discussion, but was soon dropped, for the states and peoples had too little confidence in one another to co-operate systematically in great affairs. The various pacts and protocols, and treaties of mutual assistance drafted from time to time at Geneva, were regarded by many as likely to revive the old system of military alliances and therefore as being contrary to the spirit of the covenant; while the much-advertised Kellogg Pact, which declared that the signatories were not debarred from the right to defend themselves against unprovoked attack, was thereby reduced to the level of a pious assertion. The optional clause (q.v.), referring disputes to the permanent court of international justice, was futile, for the signatories pledged themselves only to the submission of legal or treaty disputes, thereby excluding many of the most inflammable problems. Disarmament proved a snare, for no one could force, after the Washington treaties, which were proudly described by Balfour as an unmitigated benefit to mankind, that Japan would before long abandon her conciliatory mood, resume her expansionist drive, and repudiate her treaty obligations. France, following the repudiation of Wilson by Congress in 1920, concluded agreements with Belgium in 1920, Poland in 1921, and Czechoslovakia in 1924, and then looked in vain to Curzon for a new military alliance with England. In 1934, when France, alarmed by Hitler's armament estimates, broke off discussions with Germany, disarmament was dead. Finally the rearmament of Germany, the It. invasion of Abyssinia followed by a vacillating policy of sanctions by Britain and France, the dispatch of Italo-Ger. troops to Spain to support Franco, to say nothing of Jap. aggression in China, not only threw peace to the winds but were in effect the rather obvious beginnings of the new world conflagration, which was indeed the more probable from the undignified efforts of Britain to appease the dictators coupled with her glaring military weakness. When Britain's belated rearmament campaign at last got into its stride its effect was to bring war nearer, for with her vast resources her strength was bound to grow quickly from year to year, while Hitler and Mussolini, who had then long been preparing for conflict, adjusted their time-tables accordingly and,

in the result, struck when their power was at its zenith. The attempt to organise the world was, however, again made after the end of the Second World War, in the United Nations Organisation. In the result of the race between global unity on the one hand and means of mass destruction on the other, the future of civilisation lies.

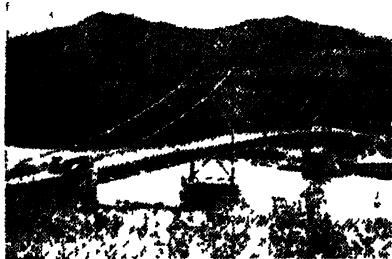
See L. F. L. Oppenheim, *The Future of International Law*, 1921; A. P. Fachini, *Permanent Court of International Justice*, 1925; P. J. Baker, *Geneva Protocol*, 1925; H. A. L. Fisher, *The Pacification of Europe*, 1925; A. Chamberlain, *Peace in Our Time* (1913-27), 1928; D. H. Miller, *The Peace Pact of Paris*, 1929; T. Baty, *Canons of International Law*, 1930; Lord Riddell, *Diary of the Peace Conference*, 1933; J. A. Salter, *The United States of Europe*, 1933; G. Schwarzenberger, *The League of Nations and World Order*, 1936; W. Arnold-Forster, *Charters of the Peace*, 1944; H.M.S.O., *United Nations To-day and To-morrow*, 1945; E. C. Anderson, *Peace in Our Time*, 1945; H. J. Morgenthau (ed.), *Peace, Security, and the United Nations*, 1946; Sir O. Manro, *Frontiers Peace Treaties, International Organisation*, 1946; National Peace Council (pub.), *The Peace Year Book*, 1947; H.M.S.O., *Peace Treaties with Italy, Rumania, Bulgaria, Hungary, and Finland*, 1947; F. Best (ed.), *International Voluntary Service for Peace*, 1920-46, 1948.

Peace River, riv. of W. Canada, rising in the Rocky Mts., near 50° N. Brit. Columbia. It flows N.E., receiving the drainage of Lake Athabasca, and finally empties its waters into the Great Slave

and ratified May 7, 1918; annulled at Versailles, 1919; treaty of Versailles signed by the Allies and Germany, June 28, 1919, ratified in Paris, Jan. 10, 1920; treaty of Saint-Germain-en-Laye, between Allies and Austria, signed Sept. 10, 1919, ratified at Paris, July 10, 1920; treaty of Trianon, between Allies and Hungary, signed June 4, 1920; treaty of Neuilly, between Allies and Bulgaria; signed Nov. 27, 1919, ratified in Paris, Aug. 9, 1920; treaty of Sevres between Allies and Turkey, signed Aug. 10, 1920 (never ratified); treaty of Lausanne, between Allies and Turkey, signed July 24, 1923; ratified in the autumn of 1923 (for clauses see under individual heads). 2. Second World War. Treaties between the Allies and Ger. satellites were signed and ratified in 1947, namely with Italy, Hungary, Rumania, Bulgaria, and Finland (the U.S.A. was not at war with the last of these), having been drafted by Britain, America, Russia, and France.

Peach, luscious fruit of *Prunus persica*, a tree (family Rosaceae) which was introduced from the E. to S. Europe early in the Christian era and to Britain in the sixteenth century. The P. and the neotame, a smooth-skinned variety, were formerly much grown in the open air, but the bulk of the market supply at the present time is grown under glass, where temps. of 45° at night and 55° by day are sufficient until the fruit has stoned, when it may be raised 10°. For the production of fruit by June the trees are started in Dec.; they are sometimes trained on walls and sometimes on wire frames. Both soil and atmosphere must be kept moist through the growing season. Outdoor culture on walls facing S. with proper management is successful in S. England. The early bloom and growth need shelter from spring winds and frosts by means of a coping fixed near the top of the wall over the trees, light canvas or other material being suspended from it during frosts nights. Planting is best done in the autumn in soil only moderately rich, but containing lime. Ps. were introduced into N. America by European settlers, and are now extensively cultivated. The P. reaches its highest perfection in the middle states: they are grown in orchards like apples.

Peacham's Case. The case of Edmund Peacham, rector of Hinton St. George, Somersetshire, who was convicted in 1616, of high treason for having written a sermon which made seditious reflections on the Crown and gov., but which had neither been printed nor pub. The case arose over the gov.'s resolution to call upon all England for a general benevolence. Somersetshire was one of the cos. which had taken the lead in protesting against the imposition. Peacham had been prosecuted in the high commission court for a libel on his bishop and on the consistory court and sentenced to be deprived of his orders. Pending that prosecution his house was searched, apparently for papers connected with the alleged libel, and the officials happened to find a MS. treatise in the form of a sermon,



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PEACE RIVER BRIDGE ON THE ALASKAN HIGHWAY, AT THIRTY-FIVE MILE POST

Lake, being for the last 120 m. called Slave R. The dist. drained by it is usually known as the P. R. dist. Its length is estimated at 1100 m. See F. H. Killo, *Peace River Country*, 1927.

Peace Treaties: 1. First World War. Treaty of Brest-Litovsk, between Russia and Germany, March 3, 1918; preliminary peace between Rumania and Central Powers, signed at Buchs, March 6, 1918,

together with some loose sheets containing, in very offensive language, such an attack on the personal conduct of the king and the actions of his ministers as would, if published (on 'publication' in this context, see *IBST*), have amounted to a seditious libel. The king's council jumped to the conclusion that the sermon, far from being an isolated piece of puritanic intemperance, had been prepared to further a conspiracy of the Somersetshire gentry. Peacock was put to the rack in the vain expectation that he would reveal a plot which had never existed. The king and his council then decided to proceed against him, not for a seditious libel, but for treason under the statute of Edward III. (see *THEYSON*) in 'compassing the king's death.' Lamb directed Bacon, then attorney-general, to confer with the judges of the king's bench to ascertain, and no doubt influence, their opinion. Chief Justice Coke objected to this mode of taking judicial opinions as contrary to the custom of the realm. The service judges, however, did not hesitate to give an opinion favourable to the Crown. Coke gave an equivocal written opinion, of the two grounds for questioning the treasonable nature of the sermon, first, that it had never been pub., secondly, that even if it had it did not amount to treason. Coke appears to have passed over the first, but boldly asserted that no mere declaration of the king's unworthiness to govern amounted to treason. P. was brought to trial at Taunton assizes, convicted and sentenced to death. He was not, however, executed but died in jail seven months later.

Another notorious case which arose out of the forced benevolence was that of Oliver St John who on being applied to by the mayor of Marlborough for a contribution, replied in a letter that all such contributions were contrary to Magna Charta and other Acts including the well-known Act of Richard III. and that it was improper for private individuals to oppose their judgment to that of the Commons in Parliament, who had refused to grant any supply. He concluded by charging the king (James I.) with breaking the coronation oath and declared his belief that to pay the benevolence would be to support the sovereign in perjury. In consequence of the letter St John was committed to the Tower and sentenced by the Star Chamber to pay a fine of £5000 and to be imprisoned during the king's pleasure. The fine was afterwards remitted, but he was not set at liberty for some time.

Peacock, Thomas Love (1755-1866), Eng. novelist and poet, b. at Weymouth, son of a glass merchant, Samuel P. of London, who left him an orphan at the age of three, his mother being Sarah Love, daughter of a master in the navy, a woman of strong character, who sympathised with her son's literary aspirations. He pub. a vol. of poetry, *The Monks of St Mark*, in 1801, and another, two years later, *Palmyra*. In Wales where he passed 1810-11, he met his future wife, Jane Gryffyth, whose

personality he is said to have adumbrated in his fragmentary romance, *Sir Calindore*. He pub. more poetry, including *The Philosophy of Melancholy* (1812), and in 1811 produced a satirical ballad, *Sir Prichard*. He became friendly with Shelley, who assisted him with money. His novels of this period were *Headlong Hall* (1816); *Nightmare Abbey* (1817), and *Nightmare Abbey* (1818). These with *Sir Calindore*, are brilliant prose extravaganzas, and full of humorous dialogue and situations; but, if they secured a certain vogue, they were not productive of much profit. About this time he was given an appointment in



T. L. PEACOCK

the India Office, which made him independent. Just prior to this he had nearly completed his romance *Maid Marian*, its delayed pub. (1822) led to the supposition that he had plagiarised Scott's *Ivanhoe* but in fact it was written before that work. It was dramatised in Planché's opera libretto of the same title (music by Bishop). He seems to have shown marked ability in his official capacity, particularly in drafting official papers. His official work interfered somewhat with his literary labours, but in 1829 he pub. *The Misfortunes of Elphin* (travesties the legend of Art under the guise of an ancient Welsh hist.), and in 1831 *Crochet Castle*. His last novel was *Grange* (1861). His short novels (*Headlong Hall*, *Nightmare Abbey*, and *Crochet Castle*) are unique in form and content in Eng. literature. Many of the leading figures of his day—Coleridge, Shelley, Byron, Annan—are the butt of his good humour, Aristophanic satire. In each the scene is laid in the country house of some *parvenu* Macena— who gives a house party at which a number of ill-assorted and violently opposed intellectuals drink and pass the bottle and gormandize while wrangling with each

other in a witty disputatious symposium. Talk is the action in these novels. Slanderly interwoven amongst the disputation are one or more love stories of an agreeable if flimsy character which the author doubtless only inserted as a concession to the literary conventions of the day. Interspersed in the dialogue are many delightful lyrics and snatches of verse, largely of a convivial strain, and indeed here may be found some of the finest drinking songs in the language. The 'Headlong ap Headlong' chorus in *Headlong Hall* and 'If I drink water while this doth last in *Crichton Castle* are excellent examples of a now vanished form while *Cypriotes* (Byron) song in *Nightmare Abbey* (There is a fever of the spirit) is as Byron in the best sense as anything Byron himself wrote. His works all too little read give abundant evidence of a strong personality, and of gifts of humour and satire. He is described by Sir Edward Stichey as a kind hearted genial friendly man who loved to share his enjoyment of life with all around him and self indulgent without being selfish. The standard ed. of P's works is the *Hallford ed.* in 10 vols by H. F. B. Brett-Smith and C. E. Jones (1924-34). There is also an ed. of his novels by D. Garnett (1948). See lives by C. van Dorn in 1911, J. B. Priestley 1927 and B. T. L. Collins, 1937 and memoirs by Sir Henry Cole 1875 and R. Garnett 1891 prefixed to their eds. of *Life and Works*. See also A. M. Freeman *John is John* Peacock, a critical study 1911 and A. H. Able, *Meredith and Peacock: a Study in Literary Influence* 1933.



PEACOCK

Peacock, or Peafowl (*Pavo*) small genus of beautiful gallinaceous birds. The common P (*P. cristatus*) is a native of India and Ceylon, in parts of which P

shooting is a recognised sport. It is bred to a small extent in France for the production of the feathers. The flesh of young birds is white and resembles a pheasant's in flavour but though formerly much valued as a table delicacy is now rarely eaten. The eggs are also edible; but it is chiefly for the beauty of the cock's plumage that it is kept. If enclosed they are very mischievous and must be given a large space containing a shrubbery or they may not breed. The male should have three to six hens with him. The hen lays about ten eggs in the spring and incubation takes thirty days. She remains with her chicks eight months, and is therefore the best mother for them. The male's head, neck and breast are blue purple and the head bears a crest of feathers webbed only at the tip. The feathers of the back are green with copper coloured lining the whitish wings are striped or barred. The glossy green feathers on the tail are the tail coverts the true tail feathers being a dark rich chestnut. The female's plumage is much less subdued. The Japanese P (*P. mutus*) is a very beautiful species and breeds freely with the other. There is a third species the black winged P (*P. de jennu*) which is believed to be a hybrid of the common species.

Peacock Butterfly (*Panassa io*) beautiful and common butterfly measuring about 2 in across the wings which are a dull blue or brownish red and which bear each an eye rather like those in the peacock's tail. The butterfly hibernates through the winter and in early spring lays its eggs on stinging nettles; they hatch into a black and yellow caterpillar, with six rows of black spines and a series of white dots arranged transversely along the body.

Peafowl, see PEACOCK.

Peake, Harold John Edward (1867-1946) Brit archaeologist and anthropologist at Liverpool trained at Leicester for estate management whence he acquired considerable knowledge of land tenures and thus enabling him to write on old records in *Memorials of Leicestershire*. He travelled widely in India and the Far East countries. He was made honorary curator of Newbury Museum which he developed as an important archaeological centre. A pioneer in the investigation of the distribution of types he realised the close interdependence of physical anthropology and material archaeology, as may be seen from his *Beginnings of Civilisation* (1913). P was a member of the council of the Society of Antiquaries (1928-30), and was awarded the Huxley medal of the Royal Anthropological Institute in 1940, for his *Study of Prehistoric Times*. His other works in this field include *The English Village* (1922), based on his lectures at the Univ. College of Wales, *The Corridors of Time* (with H. J. Fleure 1924), *The Archaeology of Berkshire* (1926), while his more popular works include *The Origin of Agriculture* (1926), *The Flood* (1930), and *Early Steps in Human Progress* (1933).

Peak, The, mountainous tract of NW

Derbyshire, England, much visited by tourists on account of its extraordinary caverns and other curiosities. It forms the culminating point of the Pennine Chain, and its prin. summits are Kinder Scout (2084 ft.), Axe Edge, and Mann Tor. Castleton is the chief tn. of the dist., which is drained by the Derwent, the Wye, and the Dove. Peveril Castle, now in ruins, was built by a natural son of William the Conqueror, and stands on a rocky eminence. The Devil's Hole, near Castleton, is another feature of interest. The dist. abounds in minerals. The P. is scheduled to become a national park. See Sir W. Scott, *Peveril of the Peak*, 1822.

Pea Nut, Ground Nut, or Earth Nut, see GROUND NUT.

Pear. The origin of the P., as of many other long cultivated fruits, is uncertain. Flin. mentions thirty-two varieties in cultivation by the Romans, and some authorities hold that all the existing races are derived from a single species. Two distinct forms appear to be natives of Britain—*Pyrus communis*, with small and bitter fruits, and *P. cordata*, the lesser, or Celtic P., with small apple-like fruits and leaves heart-shaped at the base, occurring wild in Devonshire, Cornwall, and Brittany. The bergamot Ps. are derived from *P. persica* (peach), and some Fr. varieties owe their origin to the Austrian snow-leaved P. The edible fruit of *Persea gratissima* (or *americana*) is the avocado P. of the tropics. It is also known as the Alligator P. The P. tree is less straggling and more erect than the apple, and its long-stalked leaves, which vary considerably in shape, turn black when dried. A red-flowered P. occurs in S. Europe, but as a rule the corymbose clusters are white and appear two or three weeks before the apple bloom. The wood of the P. is fine-grained, heavy, and strong; its chief use is for making drawing instruments. Ps. are naturally deep rooting and are therefore often grown on quince stock, the roots of which are shallow; though some varieties, which dislike direct contact with the quince, have to be double-grafted. Trees should be planted in the autumn in a well-drained site protected from the N., and the larger varieties do best on S. walls. Ps. are best gathered before they are absolutely ripe and stored in a slightly warmer temp. than apples.

Pearl, Raymond (1879-1940), Amer. biologist; b. at Farmington, New Hampshire. He graduated at Dartmouth, 1899, gained his Ph.D. at the Univ. of Michigan, 1902, and studied in Leipzig and London. From 1925 he was director of Institute for Biological research, Johns Hopkins Univ. He is chiefly known for his work on heredity and seriation. Pubs. include *Variation and Differentiation in Ceratophyllum* (1907); *Modes of Research in Genetics* (1915); *The Nation's Food* (1919); *The Biology of Death* (1922); *Introduction to Medical Biometry and Statistics* (1923); *Studies in Human Biology* (1924); *The Biology of Population Growth* (1925); *Alcohol and Longevity* (1926); *To Begin With* (1927); *The Rate of Living* (1928); and *The National History of Population* (1939).

Pearl, lining of the shell of many marine and fresh-water molluscs. It is a secretion laid on in a very thin coat and overlaid repeatedly so that it attains considerable thickness. It consists of calcium carbonate, with various organic matters; sp. gr. 2.3 to 2.7. The iridescence is partly due to the number of very thin layers and probably to the varying conditions of growth. P. is produced chiefly by *Avicula*, *P. oysters*, and the riv. mussels, *Unionida*.

Mother of Pearl consists simply of the lining, which is cut out and fashioned into useful and ornamental articles, and is particularly used for inlay work. It is obtained from species and varieties of the genus *Margaritifera*, the best coming from Macassar, Maula, and W. and N. Australia. The Straits Settlements, Panama, and some Pacific Is. send large quantities into the markets.

Distribution.—The Persian Gulf, particularly round the Is. of Bahrain, is especially noted for its auct. and magnificent ground. There are other fisheries in the Polyneesian Is., the Sulu Archipelago, off New Guinea, W. Australia, Queensland, Torres Strait, Ceylon, and America off Lower California. The species containing the Ps. are *M. vulgaris*, *Avicula macroptera*, and *M. fucata*; the last-named provides the finest specimens in the Persian Gulf.

Formation.—Ps. are due to the attempt on the part of the mollusc to kill and rid itself of a minute worm. In the case of the Ceylon fisheries, Herdman made a complete study of the question; the parasite was a larva of a tapeworm, and the life-history is traced; in the free-swimming stage it attacks the oyster, which is devoured by the file-fish, the ray which feeds on this being the host of the adult form. Lyster Jameson, in the case of the common mussel, found that the pest was a trematode, the adult of which is found in the eider duck and scoter; their droppings infect the cockles and carpel shells and these in their turn the mussels. Sand and other irritants may in some cases also be the nucleus round which the Ps. are formed. In any case the mollusc surrounds the irritant with an excretion which solidifies into a thin layer of 'nacre,' more and more concentric layers are added, until an almost truly spherical P. is formed. These are found chiefly in the soft parts of the mollusc, or loose. Some are found in the shell and are hemispherical, the *perle bouton*. *Perle Baroque* is solid and not so well shaped, while *coq de perle* is hollow and covered with irregular knobs. **Fresh-water pearls** are found in the N. hemisphere in riva. of the temperate region; fishing was carried on in Scotland some three hundred years ago, and Brit. Ps. are mentioned by Pliny and Tacitus. **False pearls** are clever imitations; the scale of fresh-water fish is digested in ammonia and injected into thin glass balls till the film forms on the inner surface; wax or gum is then injected to give a solid interior, while the glass is removed by hydrofluoric acid. 'Cultured' Ps. are

produced by introducing into its flesh a foreign substance, which the oyster covers with nacre.

See E. W. Streeter, *Pearls and Pearl-ash*, 1886; Sir W. A. Herdman, *Report to the Government of Ceylon on the Pearl-oyster Fisheries of the Gulf of Manaar*, 1903-5; G. F. Kunz and C. H. Stevenson, *Book of the Pearl*, 1908; L. Rosenthal, *Au Royaume de la perle*, 1926; and F. D. Burdett and P. J. King, *Odyssey of a Pearl Hunter*, 1931.

Pearl-ash is prepared from wood ash. The potash is extracted by solution, evaporated out and strongly heated, thus giving a refined 'potash.' The chief

submarine was sighted at 6.30 a.m. in the prohibited area outside P. H. and sent to the bottom. Later three midget Jap. submarines passed unmolested into the harbour, the net across the entrance not having been closed. The air attack, carried out by small waves of planes from sev. aircraft-carriers came from the N. Less than 200 Jap. planes took part, but their attack was directed to predetermined objectives. The prin. airfields (those at Kurehoh, Ewa, Wheeler Field, and Hickham field) were singled out for attack. There was heavy loss of Amer. life, and almost every Amer. plane was destroyed or disabled on the ground.



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PEARL HARBOUR: DECEMBER 1941

constituent of P. is potassium carbonate, K_2CO_3 . P. is of interest as the first driving agent for gases; it was introduced for this purpose by H. Cavendish about 1770.

Pearl Harbour, inlet with a narrow entrance, about 7 m. W. from Honolulu, Oahu Is., belonging to the Sandwich or Hawaiian group, in the E. Pacific Ocean. In order to protect the Pacific coast and to control the Panama Canal, the U.S.A. Gov. fortified it; important and extensive military works were constructed. The dredging of P. H. was finished in 1912, and dry docks, fortifications, as well as a naval station, constructed. The dry dock at the naval station was officially opened in Aug. 1919. On Dec. 7, 1941, P. H. was suddenly attacked by a large force of Jap. bombers and great damage was done to warships, installations, etc., with considerable loss of life. Thus was America forced into the Second World War.

The Japanese Attack on Dec. 7, 1941.
—Prior to the Jap. air attack a Jap.

Later, Jap. torpedo-planes came in line astern, turned round E. and headed for the Amer. battleships, which were anchored bows to stern like a string of barges. Again there were serious casualties, and many ships were sunk, including the battleships *Oklahoma* and *Arizona*.

Fifth-column treachery played a large part in the success of the Jap. attack. The official report of the Roberts Inquiry Board shows that there were some 200 agents in Honolulu alone who were acting under orders from the Jap. consul-general. A host of spies were organised as café-owners, petty merchants, and contractors, all in the pay of the Jap. 'tourist bureau,' and all profiting by their Amer. citizenship. The chief fifth-columnist body, composed largely of Jap. 'students,' was financed by agents of the S. Manchurian Railway Company and, being sufficiently numerous to control elections, they placed their own officials in important posts in the public utility services and in the civil service. This gave them ample oppor-

tunity to gauge the precise naval strength in P. H. The board, however, considered that the attack would have been far less damaging but for the over-confidence and complacency of the Amer. armed forces. Months before the attack the commanders, Lt.-Gen. Short of the army and Adm. Kimmel, commander-in-chief of the Pacific Fleet, had been warned by the Amer. Gov. in Washington to expect war with Japan, which would probably begin with a surprise attack on P. H.; but the sole precaution taken was to increase the guard against sabotage. The all-important airfields were laid out without the slightest concealment or camouflage. Yet although the commanders above mentioned had to assume responsibility for Hawaii's military unpreparedness, all America was morally guilty. As has been well said, Hawaii, sitting behind its 'Magnificent Line' of the Pacific Fleet, simply reflected the over-confidence and complacency of the mainland. The reports of the army and navy boards of inquiry and statements on them by the secretaries of war and the navy were made public in Aug. 1915. The Army Board concluded that the extent of the disaster was due primarily to the failure of Gen. Short adequately to alert his command; to the failure of the war dept. to direct him to make an adequate alert; and to the failure to keep him sufficiently informed of developments in negotiations between Japan and the U.S.A. The board also criticised Gen. Marshall for not keeping Gen. Short fully advised of the growing tenseness of the Jap. situation and for not investigating the state of readiness in Hawaii between Nov. 27 and Dec. 7 (information in Washington on Dec. 6 indicated an almost immediate break with Japan). But the secretary of war, while considering that Gen. Short's relief of command was sufficient punishment for his errors of judgment, resisted the criticism of Gen. Marshall as also criticism of Mr. Cordell Hull. The Navy Board found that Adms. Stark and Kimmel did not do the necessary things to prevent just such a defeat as had occurred and that they failed to demonstrate superior judgment. The secretary of the navy directed that neither Adm. Kimmel nor Adm. Stark should hold any position which required the exercise of superior judgment. Neither the secretary of war nor the secretary of the navy considered that any officer concerned with the disaster should be court-martialled, and in this they agreed with the recommendations of the boards of inquiry that nothing further should be done. See U.S. State Dept. White Paper, *A Record of the Efforts for Peace and American Foreign Policy during the Fateful Decade from 1911 to 1941*; O. D. Tollschna, *Tokyo Record*, 1913; and D. Marley (ed.), *The Daily Telegraph Story of the War*, vol. II., 1913.

Pearl Islands, small group of is. in the bay of Panama, 80 m. S.E. of Panama, belonging to Colombia. Pearl fisheries are carried on.

Pearrell, Robert Lucas de (1795-1856), Eng. musician and composer, b. at Clifton.

Besides his musical works (including madrigals and cantatas) he made a trans. of Schiller's *Wilhelm Tell*. He lived much in Germany, and his compositions and theories were influenced by the strict style of the classical Germanic composers.

Pearse, Padhraic (Patrick) Henry (1879-1916), Irish politician and scholar, b. in Dublin; associated from his youth with the literary side of the extreme nationalist movement and an original member of the Sinn Féin organisation. He founded St. Enda's College, a secondary school for boys, designed for the encouragement of Irish nationalism. In 1897 he also founded the New Ireland Society. He was elected to the executive of the Gaelic League and ed. its weekly journal. On the outbreak of the Easter rebellion (1916) he became commander-general of the Irish Republican Army and president of the Provisional Gov., and he was a signatory of the declaration of the Irish Republic. After holding out for a week against the gov.'s troops he surrendered unconditionally, was tried by court martial and executed. He was the author of poems, stories, critiques, and plays. His *Collected Works* were pub. in two vols. (1917 and 1918).

Pearson, Sir Cyril Arthur (1866-1921), Eng. journalist and newspaper proprietor, b. at Woke, near Wells; educated at Winchester. He began his journalistic career by joining the staff of Sir George Newman. Having won a competition, he secured a sub-editorship on *Tu-Bits* as a prize. He became manager of the firm; but, after remaining in this position for four years, left to start *Pearson's Weekly* as an independent venture. This was followed by *Home Notes*, *Pearson's Magazine*, *Short Stories*, *Ladies' Magazine*, *M.A.P.*, *Daily Express* (1900), and *Rapid Review*. In 1903 he became owner of the *Standard* and chief owner of the *St. James's Gazette*. In 1910 his sight began to fail, and he soon went totally blind. Thereafter, he devoted his chief energies to promoting the welfare of the blind. Founded St. Dunstan's charity for blinded sailors and soldiers, 1915. In 1916 he was made baronet; G.B.E. 1917. Wrote *Victory over Blindness* (1919). See life by S. Dark, 1922.

Pearson, Hesketh, b. (1827), Eng. author, b. at Hawford, Wiltshire; educated at Bedford Grammar School. In 1911 he went on the stage, and took part in various productions by Treco, Granville Barker, and George Alexander. After service in the First World War he returned to the stage, but during the next ten years he also made a beginning in literature with the pub. of four books, of which *Modern Men and Manners* was the first (1921). With *Doctor Parva*, pub. in 1930, he entered upon the career in which he has since made a wide reputation in England and America as a writer of biographies notable for their zest, humour, and power in delineating character and describing incident. These include Sydney Smith (*The Smith of Smiths*, 1931), Hazlitt (*The Fool of Love*, 1934), Gilbert and Sullivan (1935), Lauchlin (1936), Tom Paine (1937), John Nicholson (*The Hero*

of *Delhi*, 1939) and Bernard Shaw (1942). He has since written lives of Conan Doyle (1943), Oscar Wilde (1946), and Dickens (1949). His autobiography, *Thinking It Over*, was pub. in 1938.

Pearson, John (1813-86), bishop of Chester, *b.* at Great Snoring, Norfolk; studied at Cambridge, fellow of King's College (1834-40), M.A. (1839), D.D. (c. 1860). In 1840 he became prebendary of Salisbury and rector of Thorington, and in 1845 acted as chaplain to Goring's army, the last remnant of the Royalist forces. In 1854 he accepted a charge at St. Clement's, Eastcheap, London, and in 1859 pub. his sermons. *An Exposition of the Creed*, a work of great ability and reputation. In 1860 he became master of Jesus College, Cambridge; in 1861 joint superintendent with John Karle of a trans. of the Prayer Book into Lat.; in 1862 master of Trinity College, Cambridge; and in 1873 bishop of Chester. His *Minor Theological Works*, ed. with a memoir by E. Churton, were pub. in 1844.

Pearson, John Loughborough (1817-97), Eng. architect, *b.* at Brussels. He came to London and worked with Anthony Salvin and Philip Hardwick, and in 1843 set up independently, becoming famous as a restorer of Eng. cathedrals. In 1870 he was responsible for the restoration of Lincoln Cathedral, and in 1879-87 accomplished his greatest original work as architect of Truro Cathedral. He also restored Westminster Hall, part of Westminster Abbey, and the cathedrals of Peterborough, Canterbury, Bristol, Rochester, Chichester, and Exeter. He became L.S.A. in 1853; F.R.I.B.A. in 1860, gold medalist, R.I.B.A., and R.A. in 1880.

Pearson, Karl (1857-1936), Eng. scientist, *b.* in London. Educated at Univ. College School, London, and Cambridge, where he was third wrangler. In 1882 he became prof. of geometry at Univ. College, London, and in 1885 prof. of applied mathematics and mechanics there. He was Galton prof. of eugenics in the Univ. of London, and Darwin medalist of the Royal Society. His works include *Inquiries into Human Faculty and its Development* (1883); *The Moral Basis of Socialism* (1885); *History of the Theory of Evolution and Strength of Materials* (with J. Toddhunter, 1886-93); *Socialism in Theory and Practice* (1887); *The Chances of Death, and Other Studies in Evolution* (1897); *National Life from the Standpoint of Science* (1901); *Grammar of Science* (1902, Everyman's Library, 1931); *Tables for Statisticians* (1914-30); *Life and Letters of Francis Galton* (1915-25); ed. *Biometrika* (1902-30), and *Annals of Eugenics* (1925-1930).

Pearson, Lady, see COOPER, GLADYS.

Pearson, Westman Dickinson, see COWDRAY, VISCOUNT.

Peary, Robert Edwin (1856-1920), Amer. Polar explorer and admiral; *b.* at Cresson Springs, Pennsylvania. Entered the navy in 1881, and worked as engineer's assistant on the Nicaragua Canal. In Arctic exploration he is celebrated as the first to reach the N. pole. In 1886 he reconnoitred the ground in Greenland; in 1891-

1892 he spent thirteen months in N. Greenland, crossed it by sledge, a 12,000-m. journey, and proved it to be an is. A similar sledge journey was performed in 1893-95 in N. Greenland during a twenty-five-months' stay there, and P. discovered the meteorites at Cape York. In all his journeys P. utilised Eskimoes; and we are indebted to him for studies of them, particularly those of Whale Is. Summer voyages were undertaken in 1896 and 1897. The next journey occupied four years, 1898-1902, and was again spent in exploring the N. end of Greenland and its is. The *Roosevelt*, a specially built vessel, equipped with wireless telegraphy, was used in the expedition of 1905. He reached the then furthest N. in lat. 87° 6', 200 m. from the Pole—the big 'leads' and ice drift causing great trouble. He wintered 1908-9 at Cape Sheridan in the *Roosevelt*, and started on a sledge journey in the following season for the Pole; this he reached April 6, 1909. He pub. *Northward over the Great Sea* (1898); *Near the Pole* (1907); and *The North Pole* (1911); also addresses to the Royal Geographical Society in their *Journal* (1903 and 1910). He was made a rear-admiral in 1911. See lives by F. Green, 1926, and W. H. Hobbs, 1937.

Peasant Proprietor, see METAYER SYSTEM and SMALL HOLDINGS.

Peasantry, term applied to rustics or countrymen, including agric. labourers and peasant proprietors, i.e. persons owning their own cottage and small amount of land. Every country has its peasants or rustic classes. See VILLAGES for hist. of Eng. peasants; METAYER SYSTEM and SMALL HOLDINGS. See J. C. and H. F. Cox, *Rise of the Free Labourer*, 1874; J. W. Robertson-Scott, *The Dying Peasant*, 1926; Eileen Power, *Peasant Life (c. 1100-1500)*, 1932; and M. E. Fordham, 'European Peasantry,' in vol. v. of *European Civilisation*, 1937.

Peasants' Revolt (1381). In the reign of Richard II. the general distress among the poorer classes in England, following on an epidemic of the Black Death, and discontent at the enactment of a statute of labourers which attempted to prevent the peasantry taking advantage of the scarcity of labour resulting from the Black Death, came to a crisis when the poll-tax was enforced in 1379. Riots broke out in sev. parts of England and a mob, sev. thousands strong, seized Rochester Castle and marched to Maidstone. They chose Wat Tyler to be their leader, a man of obscure origin but undoubted courage. Canterbury was seized and sacked; they then marched to London. John Ball, 'the mad priest of Kent,' joined them, having been liberated from the archbishop's prison. They continued burning and plundering, and many beautiful buildings were burnt and sacked, among them John of Gaunt's palace of the Savoy. On reaching London they seized the prisons of Newgate and Fleet. London was the scene of pillage and riot. The boy king rode out to confer with Tyler, but with little effect. The mob then seized the Tower and murdered Arch-

bishop Sudbury and Sir Robert Hales. Richard again went to make peace at Smithfield; Sir Wm. Waiworth, the lord mayor of London, who rode with the king, killed Tyler; meanwhile the bishop of Norwich had routed the Norfolk rebels, and the revolt was broken. See E. Powell, *Rising in East Anglia in 1381, 1385*; Sir O. Oman, *The Great Revolt of 1381, 1386*; and L. A. G. Strong, *King Richard's Land* (for children), 1936.

Peasants' War. In 1524 the peasants of the Black Forest, Germany, influenced chiefly by economic distress, banded together and rose against the nobles. The revolt rapidly spread throughout the S. of the country. They demanded in twelve articles the right to elect their own ministers, to be allowed to kill wild game and to fish, and the reduction of the villain service. In Thuringia the peasants were exceedingly determined and violent. The army of the Swabian League, encouraged by Luther, defeated them at Leipheim in 1525, and over 100,000 were killed. See F. Engels, *The Peasants' War in Germany* (trans.), 1927, and O. H. Brandt, *Der Deutsche Bauernkrieg (1525)*, 1929.

Peastone, see OOLITE.

Peat, deposit of decaying vegetable matter in the presence of stagnant water, and formed of mosses, marsh, heath, and moorland plants. In a P. bog the surface is generally covered with growing plants, while below is the decomposing matter; the deposit may be many feet deep, becoming in the lower part brown or black in colour and compact in structure; indeed, under great pressure and at high temp. coal is produced in this manner, oxygen and hydrogen being given off till little else but carbon remains. In dists. where it abounds, as in Ireland, where P. is estimated to cover one-seventh of the whole area, P. is cut into turfs, stacked to dry, and employed as fuel; but its other uses are numerous. It makes an excellent absorbent litter, has been manufactured into numerous fabrics, and from upland P. the fibrous material used in the culture of many garden plants is obtained. See also under FUEL. See B. F. Haanel, *Facts about Peat*, 1924; and H.M.S.O., *The Winning Harvesting, and Utilisation of Peat*, 1918.

Peat Moss, see BOG MOSS.

Peš (Ipek, Pekia, Pecs, or Petch), prov. and tn. of former European Turkey, vilayet of Kossovo, 73 m. from Scutari, on the White Drin, or Bistrica. Now included in Serbia, Yugoslavia. It has a noted monastery, residence of the Serbian patriarchs up to 1690. Pop. about 13,000 (mainly Muslim Slavs). See Edith Durham, *Through the Lands of the Serb*, 1904.

Pecan, or **Pecan** (*Carya oliviformis*), tall hickory tree, native of N. America, bearing long leaves and edible nuts of exceptionally good flavour. The shell is thin and the kernel is easily extracted.

Pecary (*Didactyles*), genus of two species of tropical Amer. pigs, which differ from old-world swine by the presence of a strong-smelling gland in the middle of the

back, secreting a musky substance, and by the upper tusks being directed downwards instead of upwards. They have no tail and the fifth toe of the hind foot is absent. Only two young are produced at a birth. Adult animals are from 16 to 18 in. high and weigh from 40 to 60 lb. The collared P. (*D. takapu*) extends from Patagonia to the S. border of the U.S.A. The white-lipped P. (*D. labiatus*) ranges between Brit. Honduras and Paraguanay, where it associates in large herds which often seriously damage cultivated crops. Both P.s. are pugnacious and dangerous, capable of inflicting severe bites. They are generally hunted with well-trained dogs, and after a short chase are brought to bay, when they are killed with fire-arms.

Pecci, Giocchino, see LEO (popes), *Leo XIII.*

Pechonga, see PERSIMO.

Pechili, Gulf of, inlet of the Yellow Sea, between Shantung and the Korean Peninsula. The rivs. Hwang-ho and Petchi-ho discharge into it, and the port of Peking stands at its head.

Pechora, see PETCHORA.

Pechham, dist. of London, and part of the bor. of Camberwell, lying on the boundary of Kent and Surrey. P. was once a vil. with an eighteenth-century manor, in the par. of St. Giles, and was mentioned in *Domestick Book*. At one time P. manor was the property of Westminster Abbey, and later of Henry I. In P. are the South Metropolitan Gas Works, the Licensed Victuallers' Assylum, and the Pioneer Health Centre, whilst the manor is devoted to the cure of nervous diseases. After 1840 P. became built up and industrialised, but P. Rye Park still remains unspoilt. Browning and Goldsmith lived in P.

Pechham Health Centre, see PIONEER HEALTH CENTRE.

Pecock, Reginald (c. 1395-c. 1460), Welsh bishop and author. He became a fellow of Oriel College, Oxford, in 1417, and took holy orders. In 1431 he became master of Whitlington College, London, and rector of its church; in 1444 bishop of St. Asaph, and in 1456 bishop of Chichester. He was an active controversialist, most of his energies being directed against the Lollards. In 1447 he roused popular indignation by a sermon against church reform, delivered at St. Paul's Cross. His works, including *The Douel* (c. 1410), *The Repressor of Overmuch Blaming of the Clergy* (1455), and (1456) *Book of Faith* (A Treatise proving Scripture to be the Rule of Faith), brought him into disrepute with the authorities. In 1457 he was expelled from the Privy Council, of which he had been made a member, and resigned his bishopric. In his prose he had clarity, the gift of choosing homely examples, and a wealth of words. His vocabulary was even excessive; drawing on its double source, Eng. and Fr., he is tautologous and redundant. The standard work on P. and his writings is C. Babington's ed. of *The Repressor* (Rolls series, 2 vols., 1860). **Pecos**, riv. of the U.S.A., rising in N.H.

New Mexico, and flowing S.E. and S. to join the Rio Grande 37 m. N.W. of Del Rio. Its prin. importance is as a source of irrigation, the U.S. national reclamation service having estab. projects at Carlsbad and Hondo to serve 30,000 ac. Erosion control experiments have been made. Length 800 m.

Pecs (Ger. *Funkirchen*), tn. of Hungary, once a royal free city, cap. of the co. of Barána. It is situated on Mt. Meczek, 106 m. S.W. of Budapest and on the railway to Mohacz. Reputed to be one of the oldest tns. in Hungary, it existed in Rom. times, and, in the Frankish-Ger. epoch, was known as *Quinque Eccles.*, whence the name *Funkirchen*. The cathedral is believed to have been founded by St. Stephen of Hungary, and its bishopric instituted, in 1009. In the fourteenth century P. had a univ. but it did not survive the Magyar annihilation by Suleyman in 1526. The Hungarian Univ. of Bratislava has lately been removed to P. The tn. is noted for its sparkling wine and porcelain. P. is now one of the army dists. of Hungary. Pop. 46,000.

Pécs (Yugoslavia), see **PEČ**.

Peculiar (O.F. *peculiar*, private; Lat. *peculiaris*, of private property), in Eng. law, a particular par. or church having jurisdiction within itself, and exempt from the jurisdiction of the ordinari. The courts of Ps. in these jurisdictions amounted to about 300 in England and Wales, and had jurisdiction in reference to probates of wills before the constitution of the Court of Probate. Their jurisdiction is still somewhat obscure.

Peculiar People, see **FATH-HEALING**.

Pedal (Lat. *pes*, foot), name given to a lever worked by the foot in various musical instruments, also on a bicycle, etc. The organ has a P. keyboard of twenty or more P.s., the Eng. piano usually only two (sustaining, improperly called 'loud,' and 'soft'), whilst the harp has seven foot levers to raise the pitch of the notes.

Pedanius, see **DIOSCORIDES PEDACIUS**.

Pedestrianism (walking in athletics), see **ATHLETICS**.

Pediculus and **Pediculosis**, see under **LICE**.

Pedigree, tabular view of the members of any particular family, with the relations in which they stand to each other, together, usually, with some slight notice of the prin. events of the life of each, such as the time and place of birth, marriage, death, and burial. Sometimes these are accompanied by reference to par. registers, monumental inscriptions, marriage settlements, or other documents containing evidence of the facts mentioned in the P. But when much of such additional information is introduced, the record is a genealogical hist. rather than a P. P.s. properly so called are not of very frequent occurrence in the writings of the Middle Ages, but later the continual claims to dignities and armorial insignia prompted the College of Heralds to compile a public record of all the families of distinction, and, as a consequence, a splendid collec-

tion of Ps. (to be found in the visitation books at the College of Arms) has come down to us. Besides these, there are private collections in the library of the Heralds' College and in the Brit. Museum, and in private possession. It is only in the case of peers that the registration of a P. is compulsory. See J. H. Round, *Family Origins*, 1930, and A. W. H. Clarke, *London Pedigrees and Coats of Arms*, 1935.

Pediment, triangular space over the portico at the ends of the roof of classic buildings. It is enclosed by the horizontal and the raking cornices, the latter of which follow the slopes of the roof. The P. may be called the gable of classic buildings. It is frequently enriched with sculpture, for which it forms a fine setting. The doors and windows of classic buildings are often surmounted by Ps., either straight-sided or curved.

Pedlars, see **HLAWKEIS** AND **PEDLARS**.

Pedometer, instrument which indicates the distance walked. Shaped like a watch and carried in the pocket, it is so constructed that when the body is raised by the spring of the foot then a lever acts upon the wheels and an index-hand indicates on a dial plate the number of paces (usually) or the number of miles (more rarely and less accurately) travelled. A *hodometer* (Gk. *hodos*, way) is a similar instrument for indicating the distance travelled by any wheeled vehicle. Since the mechanism is worked by the revolution of the axle, it is obviously more reliable than a P. A *cyclometer* is another form used on bicycles.

Pedro I. (Dom Pedro de Alcantara) (1798-1834), emperor of Brazil, b. in Lisbon; the second son of John VI. of Portugal and Charlotte Joachima, sister of Ferdinand VII. of Spain. He became heir-presumptive to the throne of Portugal by the death of his brother Antonio. In 1807, when Napoleon's troops under Junot invaded Portugal, Dom P. and the rest of the royal family went to Brazil under Brit. protection. In 1817 he married Leopoldina, archduchess of Austria, daughter of the Emperor Francis I. On his father's return to Portugal in 1821 he became prince-regent of Brazil, and, declaring for Brazilian independence, was crowned emperor in 1822. On the death of John VI. of Portugal, March 10, 1826, he became Pedro IV. of Portugal. In 1824 he was ousted by his brother, Dom Miguel, but abdicating the throne of Brazil in 1831, Dom Pedro returned to Portugal and conducted a successful campaign against his brother.

Pedro II. (Dom Pedro de Alcantara) (1825-91), emperor of Brazil, b. in Rio de Janeiro. His father, Pedro I., abdicated in his favour in 1831, and, after a regency, he was crowned in 1841. He ruled with much tact and judgment, but was forced to abdicate in 1889.

Pedro the Cruel (1334-69), king of Castile and Leon, succeeded his father, Alfonso XI. in 1350. He was popular with the common people on account of his justice but alienated the clergy and nobility. When he marched to put down

rebellion in Estremadura his brother, Henry, betrayed him and he was taken prisoner; but escaped and in turn speedily crushed the rebels. Becoming suspicious of every one the rest of his reign was occupied in reinforcing his own authority as a feudal tyrant and also in wars against Aragon and Granada. The epithet 'Cruel' was due to the murder of his brother Don Fadrique in 1358. Oppressive taxes now destroyed the popularity he had earned for even-handed justice. His other brother Henry returned from France at the head of other exiles, and supported by Du Guesclin with forces from Aragon and France and with aid from the pope, Edward the Black Prince was, however, persuaded to ally himself with P. and defeated Henry and Du Guesclin at Navarrete, 1367. But when P. failed to fulfil his promises, Edward recrossed the Pyrenees and left P. to his fate. Rebellions now broke out everywhere against him, and when Henry returned a second time P. was routed at Montiel and slain. See works by Prosper Mérimée, 1848, and E. Storer, 1910.

Peebles, co. in the S. of Scotland, also called 'Tweedda', a. d. consists mainly of the upper valley of the Tweed, a riv. which originates in the co. P. is bounded by Dumfries and Selkirk shires on the S., Lanarkshire on the W., Midlothian on the N., and Selkirkshire on the E. The co. is small, comprising only 348 sq. m. Its lowest point above the sea level of the sea is about 450 ft., from which to 1200 ft. is the region of cultivation, but the co., being a group of hills, is mostly pastoral, with the arable lands chiefly in the valleys. The highest hill is Brond Law, which reaches an elevation of 2754 ft.; other hills are Hartfell (2650 ft.) and Minchmure (1855 ft.). Within the co., the Tweed has for tribs. the small rivs. Eddleston, Lothian, Quair, Manor, and Lyne, besides many int. rivulets. Drachill and Neidpath castles are of interest. The chief tns. in the co. are Peebles (which is the co. tn.), an anct. royal burgh, pleasantly situated on a peninsula formed at the confluence of the Eddleston with the Tweed, and Innerleithen. Agriculture and cattle raising are the chief pursuits. Coal is mined in the N. portion of the co. Among the manufs. that of woollens is the most important. P. abounds in the remains of Brit. hill-forts, border towers, and other antiquities, and pos-s-ess numerous modern mansions of a handsome kind. It unites with Midlothian to send one member to the House of Commons. Pop. 16,200. See J. W. Buchan (ed.), *History of Peebleshire*, 1925-27.

Peekskill, tn. of New York, U.S.A., in Westchester co., on the Hudson, 42 m. N.E. of New York City. Pop. 17,300.

Peel, Arthur Wellesley Peel, Viscount (1828-1912), distinguished Speaker of the House of Commons, youngest son of the great statesman Sir Robert P., b. in London. He was educated at Eton, and Balliol College, Oxford, and was elected in 1865 Liberal M.P. for Warwick. P. became parl. secretary to the Poor

Law Board in 1868, secretary to the Board of Trade in 1871, and in 1880 under-secretary for the Home Dept. In 1884 he was chosen to fill the important office of which his name will always be associated, Speaker of the House of Commons, and to which he was thrice re-elected. He was a favourite with both sides of the House for his good judgment and impartial rulings. On his resignation (owing to failing health) in 1895, he was created a viscount and granted a yearly life pension of £1000.

Peel, John (1776-1851), Cumberland yeoman, who for fifty-five years maintained a pack of hounds at Caldbeck, where he was born and lived all his life. He is known chiefly as the hero of the song *D'ye ken John Peel*, said to have been written impromptu by his friend, John Woodcock Graves, about 1829 (some say 1820), to a folk-tune *Bonnie Annie*. It is the regimental march of the Border Regiment.

Peel, Sir Robert, second Baronet (1788-1850), Eng. statesman, b. near Bury, Lancashire, the eldest son of Sir Robert P., first baronet. He went to Harrow, and afterwards to Christ Church, Oxford, where in 1807 he took a double first. He entered Parliament in the Tory interest in 1809, and in the following year Lord Liverpool appointed him under-secretary for war and the colonies. This office he held until 1812, when he became chief secretary for Ireland for six years, during which period he contended against the growing influence of O'Connell, opposed Catholic emancipation, and established the Royal Irish Constabulary. He retired from office in 1818 with a considerable reputation as a judicious administrator and an able debater. Four years later he entered Liverpool's Cabinet as home secretary, which office he retained until the premier's death in 1827. His valuable reforms included the reduction in the number of capital crimes, prison amelioration and the foundation of the Metropolitan Police (thence called 'Peelers' or 'Bobbies'). In the following year he was, under Wellington, home secretary and leader of the House of Commons, and in 1829, being convinced of its necessity for the peace of Ireland, supported Wellington's measure for Catholic emancipation. In 1834 he became Prime Minister and chancellor of the Exchequer, but he held office only for a few months. In opposition he set himself the task of organising the Conservative party, and in 1839, when Melbourne resigned, he was invited to form his second gov., but abandoned the task in consequence of the 'bedchamber scandal'. He became Prime Minister again in 1841. He held no office save that of the first lord of the Treasury, but he was for all effective purposes chairman of the Exchequer. As a financier he proved himself very capable, and introduced many reforms in the fiscal system of the country; he took steps to develop free trade, taxed incomes over £150 per annum, and carried a Bank Charter Act in 1844. In other spheres, Catholic Irish endowments were permitted,

and the Canada Oregon border dispute settled.

He was opposed to the repeal of the corn laws, for which measure there was a strong agitation throughout the country, but after the failure of the harvest in 1845 he became convinced of its necessity. His colleagues would not support him in this, and he resigned, but Lord John Russell failing to form a gov. he returned to office and brought in and carried his Corn Law Bill. He was bitterly attacked for his change of face on this question but he had earlier laid down the principle which guided him 'As minister of the crown I reserve to myself, distinctly and



SIR ROBERT PEELE

unequivocally, the right of adapting my conduct to the exigencies of the moment and to the wants of the country.' A few days after this measure became law he was defeated on an Irish Bill and retired from office. He was thrown from his horse on Constitution Hill on June 21, 1850, and died from his injuries three days later. P. was one of the leading statesmen of his era distinguished not only for his considerable administrative ability, but also for the intellectual honesty which led him to sacrifice his own interests and those of his party for the sake of measures he considered necessary for the general welfare. His speeches were published in 1853, and his memoirs ed. by Earl Stanhope and E. Cardwell in 1856. See lives by W. Taylor 1848, Sir Lawrence Peel, 1860, Lord Dalling 1874, Viscounts Hardinge and Peel, 1891, Justin McCarthy, 1891, C. S. Parker (*Sir Robert Peel, from Private Papers and Correspondence*), 1891-1899, J. R. Thursfield 1898, and T. Lever, 1942, see also H. W. Davy, *The Age*

of Grey and Peel, 1929, and W. P. Morell, *British Colonial Policy in the Age of Peel and Russell* 1930.

Peel, tn and watering place on the W coast of the Isle of Man, 11 m N.W. of Douglas. On the summit of a rock in Peel Bay are the ruins of an ant. castle and cathedral. There are fisheries, and boats, sails, nets etc. are made. Pop. 2600.

Peel (Lat. *palus*, a stake) fortified tower or keep, especially those built in the sixteenth century in the border country of England and Scotland as a defence against raids. It was originally a structure of earth and timber, strengthened with pallisades. The later Ps. had massive square towers with turrets at the angles and a door half way up the lower vaulted part being used for cattle, whilst the upper portion served as a dwelling place.

Peels, George (c. 1558-c. 1597) Eng. dramatist b. in London began writing verse while at Oxford and in those early days wrote his *Tale of Troy* (1559). It is generally assumed that after coming down from the univ. he became an actor, but of his performances nothing is known. His first play was *The Arraignment of Paris* (1584) and this was followed by many others including *The Battle of Alençon* (printed 1594) and *The Old Man's Tale* (printed 1595) most of which were rewarded with success. He wrote many miscellaneous verses and the best among them perhaps is his satirical poem entitled *The Honour of the Porter* (1593). His works were ed. by A. Dyce (1861) and A. H. Bullen (1885). See study by P. H. Chafford 1913 and H. D. Sikes *Sidelights on Shakespeare* 1911 and *Sidelights on Elizabethan Drama* 1923.

Peenemünde, see under LIVING POME

Peepul, see BO TREES

Peerage, see NOBILITY

Peeters, Jan, see PETER JAN

Pewit, see PROVERB

Pegasus, ant. Gk. constellation. By Ptolemy the Alexandrian astronomer (c. 150) it was called *πτερόπτερον* by Hugh Bigg the Tartar (1437) 'Stellæ equine' and by Tycho Brahe (1628) 'Equus alatus'. These names all refer to its resemblance to the form of a horse. P. being the winged horse of Gk. legend. It is one of the twenty one constellations and lies between Andromeda and the head of Aquarius. The 'great square' of P. is formed by a Pegasus, β, γ, δ, and ε Pegasus and a Andromeda.

Pegasus, winged horse of the fountain which sprang from the blood of Medusa when her head was struck off by Perseus. While drinking at the fountain of Pirene he was caught by Bellarophon with a golden bridle which Athena had given the hero. With the assistance of P., Bellarophon conquered the Chimera, but endeavouring to ascend to heaven upon his winged horse he fell down upon the earth. P., however, continued his flight to heaven, where he dwelt among the stars. P. was also regarded as the horse of the Muses, and in this connection is more celebrated in modern times than in antiquity. The badge of a winged horse

was adopted by Brit. airborne forces of the Second World War.

Pegu: 1. cap. of P. dist., in a div. of the same name, Lower Burma, stands on the riv. of the same name, 45 m. N.E. of Rangoon. The tn. was founded in the latter half of the sixth century A.D., and rose to a position of great importance in the sixteenth and seventeenth centuries, being cap. of the P. Empire overthrown by Burma in 1757, and there is a fine pagoda still remaining. P. became Brit. in 1852. It is now a railway junction. In the Burmese campaign of 1915 the Jap. Twenty-eighth Army, trying to escape from the Allies' trap near P., were mown down by the allied Fourteenth Army (g.r.). Pop. 25,400. The div. has an area of 13,258 sq. m. and a pop. of 2,961,000. The dist. has an area of 4401 sq. m. with a pop. of 583,000. 2. Riv. of Lower Burma, has a length of 180 m. It has its source in the P. Yoma Mts., and flows S.S.E. and S.W. to join the Rangoon R.

Péguy, Charles (1873-1914), Fr. writer, b. in Orleans of peasant stock. His father died when he was a youth and his mother earned her living by repairing chairs. Overcoming all obstacles, the boy managed to take the courses at the Ecole Normale, and later attended the Sorbonne. He determined to remain in Paris and, with no money, he founded in 1900 a pub. which was destined to become famous, *Les Cahiers de la Quinzaine*. The *Cahiers* were something new in Fr. literary pub. They were not magazines. Rather they were complete books, often written by himself on some burning topic of the day. Romain Rolland contributed some of his best books. Others who were introduced to the Fr. public were the brothers Tharaud, Julien Benda, André Suarez, André Spire, and Bernard Lazare. But P. himself was the ardent soul of the pub. Influenced by Bergson, he proved himself a passionate seeker of the truth. Men found it difficult to understand him. The anti-clerical Socialists and the Catholics were puzzled by P., who was at the same time an ardent Catholic and an ardent Socialist. In the Dreyfus affair he became a zealous Dreyfusard, but he made a distinction between the political Dreyfusards and what he called the Dreyfusard mystics, who battled unselfishly only for the triumph of justice. As lover of Fr. hist. and an ardent Catholic at heart, he devoted much of his poetry to a celebration of the youth of Joan of Arc. In rapid succession he wrote gigantic poetical works on this subject: *Le Mystère de la charité de Jeanne d'Arc* (1910); *Le Mystère des saints innocents* (1912); *La Tapisserie de sainte Geneviève et de Jeanne d'Arc* (1913). He wrote also an enormous poem entitled *Ève* (1913). One of his most famous *Cahiers* was devoted to his master Bergson. In both his prose and his verse he hewed out a style for himself in which he did not fear to write in the popular tongue. When the war broke out with Germany he reported at once for active duty, was offered a captaincy, but preferred to be a

simple soldier. He was killed on Sept. 5, 1914, when fighting in the battle of the Marne. Since his death a whole library has been written about him, notably books by J. and J. Tharaud (1926), Daniel Halévy (*Péguy et les 'Cahiers de la Quinzaine'*, Eng. trans., 1947) and his own son Marcel, who has also revived the *Cahiers*, and above all by his friend Romain Rolland. Rolland, in his *Charles Péguy* (1942), has created a brilliant work of art out of the confused material of interminable pamphlets and even more interminable poems left by P. P. is on the whole a political writer with, however, except in such works as *Victor-Marie, Comte Hugo* (1910), in which he is a great moralist and a great critic, though his style is marred by endless repetition and intolerable exaggeration. In this latter work P. admirably reveals the pagan natural values in Hugo. His own Christian feeling, far from hindering him from seeing the beauty of Hugo's deep pantheism, is a help to clear judgment (Saurat). See also studies by P. Archaubault, 1939; J. Delaporte, 1944; and A. Rousseaux, 1946.

Pehlevi, or Pahlavi, name given by the followers of Zoroaster to the language into which the sacred books were trans. The term is also used for a written language in Persia under the Sassanian kings (see PAHLAVI).

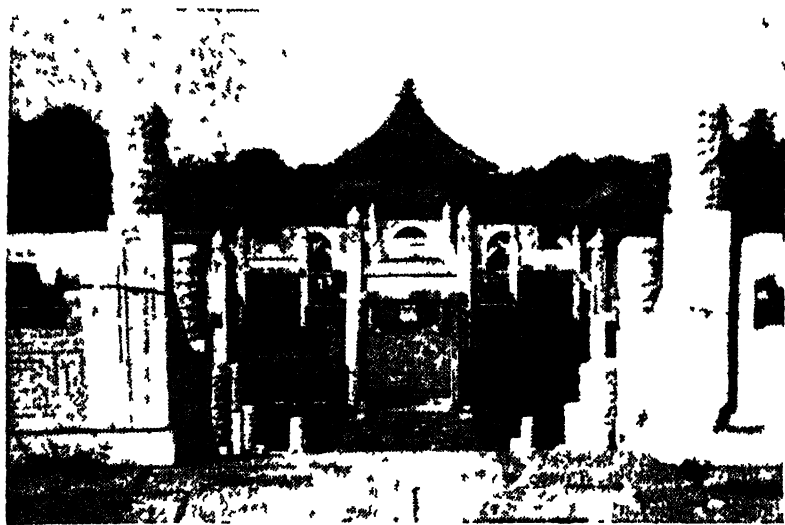
Peiho, or Pailho (white riv.), riv. of N. China, rises near the Great Wall, N. of Peking, on the slopes of the Mongolian Mts., and flows generally S.E., past Tientsin, to fall into the gulf of Pechili at Taku, after a course of 350 m. It is connected by the Grand or Yun Ho Canal with the Hwang-ho and Yangtze-kiang. There is a bar of stiff clay at its mouth which greatly detracts from its value as a waterway, and its waters are thick with silt, but it is navigable by steamers as far as Tientsin and by native boats to Tung-chow. Its largest trib. is the Hun-ho. See TAKU.

Peine, tn. of Hanover, Germany, in Hildesheim, 19 m. E. of the city of Hanover. It has a palace and a Capuchin convent. Its chief industries are connected with the iron trade, but jute and sugar are also manufactured. Pop. 17,800.

Peine Forte at Dure, species of torture formerly applied by the law of England to those who, on being arraigned for felony, refused to plead and stood mute, or who peremptorily challenged more than twenty jurors, which was considered a contumacy equivalent to standing mute. In the beginning of the thirteenth century this penalty seems to have consisted merely in a severe imprisonment with low diet, persisted in till the contumacy was overcome. But by the reign of Henry IV. it had become the practice to load the offender with weights and thus press him to death; and till nearly the middle of the eighteenth century pressing to death was the lawful mode of punishing persons who stood mute on their arraignment for felony. During the fifteenth, sixteenth, seventeenth, and even the eighteenth century various cases are recorded of the

infliction of the punishment in question. Latterly a practice prevailed, which had no sanction from the law, of first trying the effect of tying the thumbs tightly together with whipcord. Juliana Quick, in 1442, charged with high treason in speaking contemptuously of Henry IV, was pressed to death. Walter Calverly, of Calverly in Yorkshire arraigned at the York assizes in 1601 for murdering his two children and stabbing his wife was pressed to death in the castle by a large iron weight placed on his breast. In 1720 a person of the name of Phillips was pressed in Newgate for a considerable

Manchu city are 50 ft. in height and from 60 ft. in thickness at the base to 40 ft. at the top; those of the Chinese city are about 30 ft. high and from 25 ft. to 15 ft. in width. P. is less typically Chinese than for example Canton or Hangchow. Frequently invaded by Tartars and Mongols, it fell eventually to the Manchus in 1644 who made it the cap. of their empire and ruled there until the revolution of 1911. All these invasions have left their impress on the inhab. Thus, when the Mongols conquered China in the twelfth century they laid out a new city on the lines of a Mongol camp and the



E. N. A.

PEIPING THE LITTLE TEMPLE AT THE ENTRANCE TO THE TEMPLE OF HEAVEN

It is on the Marble Way from the Altar of Agriculture

time till he was released on his submission. As late as 1741 a person is said to have been pressed to death at the Cambridge assizes, the tying of his thumbs having been first tried without effect.

Peiping, or Peking, in the prov. of Chihli, lies between the Peiho and the Hunho Its in lat. 39° 54' N. and long 116° 27' E. It was the cap. of China until 1928, when the gov. moved to Nanking. The name Peking (used until 1928) signifies the N. court, to distinguish it from Nanking the S. court, where the former emperors of China resided, and where the Republican Gov. prior to the Jap invasion, held its court. P. is really composed of two cities, the outer one being inhabited by the Chinese and the inner by the Tartars or Manchus. Both cities are surrounded by massive walls, pierced by many gates which are surmounted by towers 100 ft. high. The walls of the

very broad main streets intersecting at right angles are the outcome of this plan. The inhab. too are not pure Chinese, but have strong traces of the blood of their conquerors. Although P. has most of the amenities of modern civilisation, its roots are in the remote past and the impact of the W. has had less impression on it than on any other great Asiatic city. Especially marked is the contrast with Shanghai. In any part of Shanghai the atmosphere is that of an entirely modern city. Within the walls of P. however, the S. part shows rural scenes similar to those of a typical Chinese vil., while in the N. part of the city whole districts remain much as they were two centuries ago. Distances between the walls are great, but there is no underground or overhead railway, and only a small section is served by trams or buses. The rickshaw pullers of P. once famous for endurance and speed,

have gone, for the rickshaw has been ousted by the 'pedicab,' a kind of tricycle with the passenger seated behind the driver. P. has no industries of any importance. It has become a superior kind of prov. tn. and is looked upon as the main city of culture in China, with a univ. student pop. of 20,000. The period 1900-28 saw the peak of foreign residence, with legation guards, foreign advisers, foreign firms, etc., but, following the transfer of the cap. to Nanking, came the period of decline when diplomats, guards, foreign officials, and others gradually disappeared. Externally P. has undergone no radical change. The chief period of transformation was after 1900 when the Legation Quarter which had been destroyed in the siege was rebuilt as a small modern city and many new gov. offices were built in W. style in the surrounding dist. The special characteristic of P. is its old-world charm, its memories of former glories as reflected in its palaces, parks, and temples. Pop. of the metropolitan area 1,602,000. P. is an extremely ant. city and occupies the site of a former city dating back to the twelfth century B.C. It has borne many names through the ages, and is, or was, also known officially as Shan-tien-fu. It was the scene of the Boxer rising in 1900, the siege of the legations, and their subsequent relief by a European force in Dec. of the same year. P. is the seat of a national univ., which was founded in 1898, re-organized in 1917, and admitted five women to its privileges in 1920. There is also a normal univ., and the Chiao Tung or Communications Univ., founded in 1921, has a branch at P. The Peking Union Medical College was founded in 1906. In 1915 its support was under taken by the China Medical Board of the Rockefeller Foundation. Peking was the cap. of China for 900 years till 1928, when Chiang Kai-shek's Gov. moved the cap. to Nanking. The Jap., during their occupation, restored the old name. P. was occupied by Communist forces on Feb. 1, 1949. See J. Breton, *Peking: a Historical and Intimate Description*, 1920, and H. F. Johnston, *Twilight in the Forbidden City* (1898-1942), 1941.

Peipus or Chudskoye Lake, lake of N.W. Russia, between the Estonian S.S.R. and the Leningrad Region of the R.S.F.S.R. Its length is 90 m., and the width 32 m., with an area of 1356 sq. m. It abounds with fish, and discharges its waters by the R. Narova into the gulf of Finland. In 1941 the Gers. advanced on both sides of the lake, which was the right-hand support of the Stalin line, to threaten Leningrad. The Russians reached and passed the lake in an offensive of Feb. 1944.

Peirce, Charles Santiago Sanders (1839-1911), Amer. physiologist and logician; b. at Cambridge, Massachusetts. Graduated, Harvard, 1859. On U.S.A. coast survey. Conducted investigations into earth's density and ellipticity, and light-wave lengths. First to use term 'pragmatism' in connection with philosophy, to connote a commonsense system in which Belief

is identified with Action (see *Popular Science Monthly*, Jan. 1878). When Wm. James, professing to follow P., substituted Truth for Belief in this formula—thus producing a Pragmatism the opposite of P.'s—P. renamed his own principle Pragmatism. His chief pub. work was *Studies in Logic* (1883).

Peirene Fons, see PIRENE.

Peirese, Nicolas-Claude Fabri de (1580-1637), Fr. archeologist and naturalist, b. at Beaune-sur-Ar. His interests were many, as he included numismatics, archeology, and the study of oriental MSS. among his pursuits, whilst he sent expeditions of savants to Egypt. Among his friends were François Pithou, Thou, Casaubon, and Pierre and Jacques Dupuy. Seven vols. of his correspondence were pub. by M. J. de Laroque in his *Collection of Unedited French Historical Documents* (2nd series), 1885-9.

Peisistratus, see PISI-STRATOS.

Pekan (native name), **Fisher Marten**, or **Pennant's Marten** (*Martes pennanti*), N. Amer. species, larger than those found in the Old World, being about 4 ft. in length, including the tail. Its face is dog-like; fur brown, with white patches on chest and belly. Its favourite food is said to be the Canadian porcupine (*Erythron dorsatus*), but it frequently steals the fish used to bait traps, whence its popular name fisher marten.

Pekin, cap. city of Tazewell co., Illinois, U.S.A., on Illinois R., 9 m. S.W. of Peoria. Chief industries, pork packing, coal mining, the manuf. of agric. implements, brewing, and distilling. Pop. 19,400.

Pekinese, breed of lap-dog. It is of Chinese origin, and differs from the Eng. toy spaniel in having a flat skull and tail curved over the loins. Preferably weighing five to six pounds, it is heavy in front, with short broad muzzle, falling away lion-like behind. Long-haired, with thick undercoat, it is light-red or yellow, mottled with white. The golden tan are trusted to type.

Peking, see PEIPING.

Peking Man, see under ANTHROPOLOGY.
Pelagic Fauna. The earth's marine fauna may be classified according to its distribution into three divs. These are the well-known littoral or shore animals, the deep-sea or abyssal (g.r.) animals, and those which inhabit the surface or upper strata of the open sea or ocean (*pelagics*). Among the P. E. are representatives of most of the great divs. of the animal kingdom from the lowest and simplest organisms (plankton) to the mighty cetaceans and the marine carnivora, including even one family of insects (Haliptidae). In the great depths of the ocean plant life is entirely absent, but it undoubtedly forms the basis of pelagic life. In some late minute P. E. is very scarce, and Darwin in his *Naturalist's Voyage* comments on the mystery how whales and seals, petrels and albatross, are able to subsist, a problem which in recent years was investigated by the *Discovery* Committee of the Colonial Office. The warmer parts of the ocean

swarm with life, and many of them, such as the tunicate *Salpas*, live in a 'living broth,' so abundant is the supply of Radiolaria, Foraminifera, and other Protozoa, many of which give rise to phosphorescence. The transparent glass-like appearance of many of the lower forms of P. F., often accompanied by prismatic colours, is undoubtedly a protective coloration by which the notice of pelagic birds and other enemies is escaped. Many animals pass their whole life in the open sea, but others are accustomed to visit the shores occasionally in search of prey or periodically to breed, while some, such as the larvae of echinoderms and young of molluscs, spend only a stage of their life in open water, seeking the shores to pass into the adult stage.

Pelagius, celebrated heresiarch of the fifth century, author or systematiser of the doctrine known as Pelagianism. According to this doctrine there is no original sin, and man does not need grace in order to avoid actual sin and to attain salvation; man's free will is sufficient for this purpose, though grace makes the attainment of salvation easier. P. was probably b. about the middle of the fourth century in Britain, his name being supposed to be a Gk. rendering of the Celtic appellation *Morgan*, or sea-born. He was a monk; it is certain, however, that he never received holy orders. He settled in Rome, and at the end of the fourth century he had already acquired a considerable reputation for sanctity and learning. In 410, after the sack of the city by the Goths, he and his disciple Celestius withdrew to Carthage. Here Celestius sought ordination, his doctrines became the subject of discussion, in which St. Augustine took a prominent part, and in a synod sev. opinions ascribed to Celestius were condemned. P. had meanwhile gone to Jerusalem, and news of the proceedings at Carthage having been carried to Palestine in 415, he was accused of heresy before the synod of Jerusalem by Orosius (q.v.). The impeachment failed, and in a synod subsequently held at Diospolis in the same year, P. evaded condemnation by accepting the decrees of the synod of Carthage. The W., however, was more sharp-sighted or less indulgent. A synod of Carthage, in 416, condemned P. and Celestius, and wrote to Pope Innocent I. requesting his approval of the sentence, with which request Innocent complied by a letter which is still extant. On the death of Innocent, Celestius came to Rome in person, and P. addressed a letter to the new pope Zosimus, and in a council which Zosimus held Celestius gave such explanations that the pope was led to believe that the doctrines of P. had been misunderstood. A further council of 214 bishops, however, was held in Carthage, in which the doctrines of P. were formally condemned in nine canons, which were sent to Rome with full explanations, and on receipt of these decrees Zosimus reopened the cause, cited and condemned Celestius and P., and pub. a decree, called *Epistola Tractoria*, adopting the canons of the African council. Nin-

teen It. bishops refused to accept these canons, and were deposed. Their leader, who may be regarded as the greatest theological advocate of P., was the celebrated Julian, bishop of Eclanum, near Beneventum. P. himself was banished from Rome, in 418, by the Emperor Honorius. After his banishment, P. is supposed to have returned to his native country, and to have died there. The controversy, considered as an exercise of intellectual energy, is the most remarkable in the anct. hist. of the Church. P.'s *Fourteen Books of a Commentary on St. Paul's Epistles*, his *Epistle to Demetrius*, and his *Memoir to Pope Innocent* have escaped destruction, probably from their being included by collectors in the works of St. Jerome. They are much mutilated, but yet almost certainly genuine. See G. Vossius, *History of Pelagius*, 1655, and commentaries by F. F. Buddeus, 1719, and T. C. Lillenthal, 1738.

Pelargonium, commonly but incorrectly called Geranium, a genus of perennial plants (family Geraniaceae) which, since their introduction from S. Africa at the beginning of the eighteenth century, have been highly valued as greenhouse and border plants. As exhibition plants they have not the vogue they formerly had. They are classified into five main groups: (1) zonal, with marked leaves; (2) show, with large flowers, which when semi-double are called regal; (3) fancy, with smaller flowers; (4) ivy-leaved, valuable for hanging baskets; (5) scented-leaved. Cape P., yet another group, are mostly evergreen shrubs from the Cape of Good Hope; they need greenhouse culture, as do the show and fancy kinds. All are easily propagated from cuttings. Bedding plants are set out in June and lifted again in Sept. Greenhouse plants can be brought into flower at any time by pinching off flower buds through the summer and properly regulating temp. The true *Geranium* belongs to the same family; there are sev. species, e.g. *G. molle*, *G. lucidum*, etc., commonly known as cranebills, from the long, beaked fruit.

Pelasgian means belonging to the Pelasgi, a term used by anct. Gk. writers apparently with two distinct meanings. It is used in some places simply as an equivalent of prehistoric or primeval, whilst in other passages a definite race appears to be indicated. If such a race existed it was widely spread over the coasts and is. of the E. Mediterranean and the Egean; its ethnological relations are obscure. The later Gk. writers, such as Herodotus, talk of the Pelasgi as a separate race, but their evidence was probably scanty. See *Iliad*, II. 681-84 and 840-43; x. 128-429; xvi. 233-35, etc.

Pelayo, or Pelagius, was supposed to be the first Christian king of Spain, founding the monarchy of Asturias about A.D. 718. See SPAIN and ASTURIAS.

Pelaeopoda, see BIVALVES.

Pelaliu, see under PELEW ISLANDS.

Peleus, in Gk. legend, son of Aeacus and Endeia, brother of Telamon, and king of the Myrmidones at Pthia. Together with Telamon, he was banished for the

murder of Phocus, and fled to Eurytion, king of Phthia, in Thessaly, who gave him his daughter Antigone to wife with a third of the kingdom as dowry. P. accidentally slew Eurytion at a hunt, and had to flee to Iolcus. Later he was married to the Nereid Thetis, and by her was the father of Achilles.

Pelew or Palau Islands, group of the W. Caroline Is. in the W. Pacific Ocean. Lat. 2°-9° N.; long. 130°-135° E. There are twenty-six is., of which six are inhabited. The largest is Babeltop (Babelthuap), and next in order are Korror, Arguar, I'elelu, and Elluwalk. The total area is about 175 sq. m. The group is surrounded by a coral reef. The is. are mountainous, well watered, and fertile, with a hot but healthy climate. They were sold to Germany by Spain in 1899. In 1914 they were occupied by Australia, and the treaty of Versailles placed them under Jap. mandate. Pop. (1941) 6500 Jap. and 6000 natives. An Amer. carrier force on March 29-30 (1944) attacked the Jap. base at P. in the vain hope of inducing the Jap. fleet to come out. The is. were a repeated target later in the year on the eve of the invasion of Saipan. In conformity with the allied agreement in Cairo (1943), the is. were not returned to Japan after the war, but remain under Amer. trusteeship for the United Nations. See E. M. Forster, *Letter to Madan Blanchard*, 1931.

Pelham, Henry (c. 1695-1754), Brit. statesman. He was the son of Thomas, first Baron P., and was educated at Westminster and Hart Hall, Oxford; he entered Parliament in 1717, and seven years later became secretary for war. He was paymaster of the forces in 1730, and in 1743 first lord of the Treasury and chancellor of the Exchequer. His influence in the House of Commons was great, and was based upon systematic corruption. He was not a great politician, but he was a sound, if uninspired, financier.

Pelham-Holles, Thomas, elder brother of the above, see NEWCASTLE, DUKE OF.

Pelias, son of Poseidon and Tyro, a daughter of Salmones, and twin brother of Neleus. The twins were exposed by their mother, but were preserved and reared by some countrymen. They subsequently learnt their parentage, and after the death of Cretheus, king of Iolcus, who had married their mother, they seized the throne of Iolcus. P. soon afterwards expelled his own brother, Neleus. After P. had long reigned there, Jason came to Iolcus and claimed the kingdom. In order to get rid of him, P. sent him to Colchis to fetch the golden fleece. Hence arose the celebrated expedition of the Argonauts. After the return of Jason, P. was cut to pieces and boiled by his own daughters (the Peliaes), who had been told by Medea that in this manner they might restore their father to vigour and youth.

Pelican (*Pelecanus*), genus of steganopodous birds, i.e. characterised by the four toes being united by a web. They have a huge extensible or dilatible pouch which is supported by the two flexible bony arches in the lower mandible. The

legs are short and the feet large, the tail short and rounded, the neck long, and the body large and ponderous. The wings are long and expansive, and with them the birds are capable of rapid flight, and also of soaring without perceptible movement of the wings. The species are widely distributed, frequenting the seashore, margins of lakes, and feeding almost exclusively on fish, which is deposited in the pouch for subsequent digestion. The common P. (*P. onocrotalus*) formerly existed in Britain, and is now found around the Mediterranean. Its plumage is white, tinged with red. It usually nests on the ground and lays two or three white eggs. The young are at first brown, and the mother feeds them by pushing their beak into her pouch. The appearance of the red tip of the bill pressed against her breast probably gave origin to the fable that she feeds her young on her own blood. *P. erythrorhynchus* occurs in N. America, where also is found *P. occidentalis*, the only diving P. Species also occur in Australia and Asia.

Pelican State, see LOUISIANA.

Pellon, anct., name of a range of mts. on the coast of Thessaly, associated in Gk. mythology with Ossa. The giants are said to have piled these two mts. together to reach Olympus. The chief summit is now called Mt Plessida (5398 ft.).

Pelissier, Aimable Jean Jacques, Duc de Malakoff (1794-1864), marshal of France, b. at Maromme, near Rouen. He joined the first expedition to Algiers in 1830. In 1839 he was made lieutenant-colonel and returned to Algeria, taking part in the battle of Isly in 1844. He was made general of a div. in 1850, and in the Crimea was at first in command of the first corps and afterwards held the chief command before Sebastopol. The storming of the Malakoff was his most notable success; for this he received a marshal's baton, was created Duc de Malakoff on his return to France, and was granted 100,000 francs. He was Pr. au. bas. in London from 1858 to 1859, and fr. au. bas. until his death was governor of Algeria. See life by V. Derrecagnac, 1911.

Pella: 1. anct. tn. of Macedonia, 24 m. N.W. of Salonica. It was the bp. of Philip II. and Alexander the Great, and was the anct. cap. of Macedonia. The vil. of Neochori now stands upon its site. 2. Prefecture of Macedonia, Greece. Pop. 127,000.

Pellagra (It. *pelle*, skin, *agra*, rough), disease characterised by spinal pains, digestive disturbances, and general weakness in the early stages; later a red rash appears on the skin, disappearing in autumn and recurring in the spring of each year; the skin meanwhile becomes dry and yellow. In advanced cases severe nervous disturbances are noticeable, including loss of motor power and mental delusion. P. occurs in Italy, Spain, S. France, Algeria, and Egypt; its presence has also been discovered in America, and Dr. L. W. Sambon described in 1912 some cases which had occurred in the Brit. Isles. The disease was formerly supposed to be due to the use of diseased

maize, but research indicates that P. is due to a deficiency in vitamins, particularly nicotinic acid, one of the substances present in the vitamin B complex.

Pellegrini, Carlo (1839-89), It. caricaturist, b. at Capua, but came to England. His work in *Vanity Fair*, over the signature 'Ape,' consisting of a series of portraits of public men, is one of the best examples of personal caricature extant. He also executed a red plaster statuette of Robert Lowe, Lord Sherbrooke.

Pellegrino, see VALLE, PIETRO DELLA.

Pellow, Sir Edward, see EXMOUTH, VISCOUNT.

Pellow's Group, or Sir Edward Pellow's Islands, small group of Is. in the S.W. of the gulf of Carpentaria, Australia. They lie close to the coast, opposite Port McArthur.

Pellicanus, Conrad (1478-1558), Alsatian scholar and reformer, b. at Ruffach, his real name being Kirschner; educated at Heidelberg. He joined the Franciscan friars at Ruffach, and was later transferred to Tübingen. He also held ecclesiastical positions at Pforzheim and Basle, and became one of the most learned men of his day, especially in Heb. In 1526 he became a Protestant, and in 1527 was made by Zwingli prof. of Heb. at Zurich. He wrote a Heb. grammar (1504; reproduced 1877), an autobiography (ed. in Lat. 1877, and in Ger. 1891), and a *Biblical Commentary* (1532-35) in 5 vols. See life by E. W. Reuss, 1893.

Pellico, Silvio (1788-1854), It. poet, b. at Saluzzo in Piedmont. His tragedies entitled *Lodamania* and *Francesco da Rimini* (1818) gained him an honourable name amongst It. poets. He also trans. the *Manfred* of Byron, with whom he had become acquainted. Having become connected with the secret society of the Carbonari, he suffered ten years' imprisonment, an account of which he pub. under the title *Le mie Prigioni* (1833). See lives by H. Barbiers, 1926; H. Ritter, 1832; and B. Allason, 1943.

Pelileo, bn. of Ecuador, completely destroyed, with others, in the disastrous earthquake of Aug. 1919: 3200 inhab. were killed, 320 survived.

Pellissou-Fontanier, Paul (1621-94), Fr. historian, b. at Beziers, studied law at Toulouse and went to Paris. He became acquainted with the members of the Academy through Valentin Conrart, and was made academic historian. In 1653 he issued *Relation contenant l'histoire de l'Académie française*, which gained him admission to that body. In 1657 he became secretary to Nicolas Fouquet, minister of finance, who in 1659 made him master of accounts at Montpellier. Upon Fouquet's fall in 1661, P. was imprisoned in the Bastille. He was released in 1666, and became historiographer to Louis XIV., of whom he wrote a hist. (*Histoire de Louis XIV. jusqu'à la paix de Nimègue*). He also wrote two defenses of Fouquet.

Pellitory of the Wall (*Parietaria officinalis*), bushy herbaceous plant with reddish brittle stems, hairy leaves, and axillary clusters of small flowers. The stems are very sensitive to touch. It

occurs on walls, and an infusion was a rustic medicine. Tincture of P. is made from *Anacyclus Pyrethrum* of S. Europe.

Pell-mell, see under MAIL, THE.

Pellonia, ornamental creeping plant, with round, oval, or heart-shaped leaves, olive green in colour with violet and white markings. They are cultivated in Britain as greenhouse plants, the chief species being *P. doreauana* and *P. pulchra*, the latter with a purplish stem and oblong leaves light green in colour with black veins.

Pelloux, Luigi (1839-1924), It. general and politician, b. at La Roche, in Savoy. After leaving the Military Academy of Turin, he took part in the wars of independence and distinguished himself at Custoza, and at the taking of Rome. His military career was rapid, and in 1885 he reached the rank of general. His political career was also successful; but after the troubles in Sicily and the revolutionary movements of 1898 his violent measures of repression made him very unpopular, and brought about a constitutional crisis, which, however, he skillfully handled. He was made senator in 1896.

Pelopidas (d. 361 B.C.), Theban statesman and general. In 383, when Thebes was taken by the Spartans, he went to Athens to form a party for the liberation of the city. In 379 he forced the Spartan garrison of Thebes to surrender. In 375 he defeated the Spartans at Tegyra, and in 371, in conjunction with Epaminondas, estab. Theban supremacy by the victory of Leuctra. In 367 he went on an embassy to Persia, and in 361 was killed in a successful battle against Alexander of Phœre at Cynosephale.

Peloponnesian War, chiefly between Athens and Sparta, lasted with some intervals from 431 to 401 B.C. The war may be divided into three main periods: (1) from the beginning until the peace of Nicias in 421 B.C.; (2) from the peace of Nicias until 413, when the peace was formally broken by Sparta; (3) from 413 to the capture of Athens in 401 B.C. During the first period Athens was more and more successful up to 424 B.C., when the fortune of war changed. The Athenian leader for the first two and a half years was Pericles, and thenceforward Nicias. The Spartan general Brasidas saved Megara and transferred the war into Thrace. Athens was greatly afraid of the spread of disaffection among her subject cities, and made peace on slightly disadvantageous but not dishonourable terms. During the second period, although nominally at peace, Athens and Sparta were continually employed in plots against each other's interests, and fought in the Peloponnesian and in Sicily. During the third period Alcibiades, who had commanded the Athenian expedition to Sicily, was recalled, and went for a time to Sparta. The Athenians were finally expelled from Sicily with heavy loss, and the war transferred to Asia Minor. Prior to 408 Athens won sev. naval victories, although many of her subject allies revolted. After the battle of Cynossema in 410 the Spartans

made proposals of peace which were rejected by Athens. The fortunes of the war now gradually went against Athens until after the destruction of her fleet at Argosotami in 405 B.C. and a five months' siege, the city surrendered in April 404. The defences were destroyed and Athens was made subject to Sparta, being handed over to an oligarchy of thirty. See also *Greek History*. See the *History of the Peloponnesian War* by Thucydides a contemporary. A. M. Wood ward, 'Excavations at Sparta 1926' in *British School at Athens Annual* 1927. B. W. Henderson *The Great War between Athens and Sparta* 1927.

Peloponnesus (*Pelops* and *Penon*, island) is the name of Pelops (q.v.) the ancient name for the peninsula forming the south part of Greece connected with central Greece by the Isthmus of Corinth and separated by the gulfs of Lepanto and Patras. It was divided into the districts of Achaia, Sicyonia, Corinthia, Argolis, Arcadia, Laconia, Messenia and Elis. The chief rivers were the Eurotas and the Alpheus. The earliest inhabit was probably of the Prehistoric race (see ILLUSTRATIONS), it was then occupied by Achaeans and Dorians. The chief cities were Sparta and Argos, the latter holding supremacy until the seventh century B.C. and the former thenceforward to the third century. The modern name of the country is Morea (from its resemblance to a mulberry leaf) but the name P. is still officially used as applying to Greece S. of the Isthmus of Corinth. See also MOREA.

Pelops, in Greek legend grandson of Zeus, and son of Tantalus, king of Phrygia and Dione or Eurynome. In order to test the divinity of the gods who visited him, Tantalus is said to have served up a repast to them in which the *puce de resistance* consisted of P. None touched the dish save Demeter who ate a shoulder. Zeus restored P. to life and replaced the missing shoulder by one of ivory. P. then gained in marriage Hippodamia, daughter of King Erichonius of Elis, by defeating the latter in a chariot race. This he accomplished by bribing Myrtilus, the king's charioteer, but when he claimed the promised reward P. threw him into the sea. As he did he cursed the house of P., and his curses were fulfilled. P. was held in high honour among the Greeks, especially at the Olympic games and a temple was built for him where many sacrifices were made. See Ovid *Metamorphoses* vi 404. Virgil *Georgics* iii 7. Pindar, *Olympian Odes* i 24. Hyginus *Fabularum Liber* vi 5. Phylarchus *Historia* 30. Pausanias, v 1, vi 11. Diodorus, ii 45, etc.

Pelota (Lat *pila* < *pel-la*, ball) ball game popular in Spain the Fr. Basque game, and Sp. America. Players wear a curved basket attachment (*cesta*) on the right hand. The hard ball weighs about 4 oz., is made of rubber and wire, and is covered with leather. It is struck with the *cesta* against two walls at right angles.

Pelotas, second city in Rio Grande do Sul, Brazil, at the S. of Lake Patos. The chief industry is the preserving of beef, while hides are also exported. There

are glass factories and flour mills. Pop. 72,000.

Pelists (Gk *πελισταί*, from *πῆλις*, a small round shield), species of Gk troops between heavy and light infantry, having more of the characteristics of the latter class. They wore quilted tunics and leather leggings, and in addition to the pelta carried a spear or javelin and a sword. They came into prominence during the early years of the fourth century B.C.

Peltonen, Viktori, see LINNAKOEN, JOHANNES.

Pelts see PELLS.

Pelusium, old city of Egypt near the Mediterranean sea at the N.E. point of the Nile delta. The city which is now in ruins was originally a firm stronghold of Egypt.

Pelvis, bony basin which supports the abdominal viscera and distributes the weight of the trunk to the two legs. It is formed by the sacrum, the coccyx and the ossa innominata or haunch bones, each of the haunch bones consists of three originally separate bones grown together in the adult the human human anionibus. At the junction of these is cleft is formed which takes the ball end of the femur or thigh bone. The contained vessels are for both sexes the rectum and urinary bladder for the male, the vesiculae seminales and the prostate gland for the female uterus and ovaries. The female P. is in consequence broader but shallower, while having a greater capacity, the bones are more slender the inlet more circular. It is in general modified suitably for the necessity of child bearing.

Pemba, is off the E. coast of Africa, 30 m. N.W. of Zanzibar to which protectorate it belongs. A fertile and beautiful spot. Arabs call it Al-Huthera or the Green Is. Its green hills rise abruptly from the sea. The coast is broken into many deep inlets and the sea penetrates far into the heart of the is. affords many beautiful views. Pools and small lakes of fresh water, edged with grass and covered with water lilies give a sense of coolness after the glare and dust of Zanzibar. The climate is not suitable for continued residence by Europeans. The ruins of P. relate probably to the later Middle Ages when the prosperity of the Arab and Persian settlements of the African coast was at its peak. These ruins are not of course of African origin but were built by Arabs who colonised and traded for ivory, slaves, gold, and tortoise shell. The whole of the W. is devoted to clove growing. Besides the trade in cloves there is a trade in timber, copra, and supplies for shipping. Chaka, the chief town, is picturesquely situated, but its approach is marred by a very muddy creek. Formerly it must have been impenetrable thanks to the creeks and the enormous mangrove swamps. Some 11 m. W. of Chaka lies a small inlet in long named Mtsuli, and sometimes called 'Captain Kidd's Bay' owing to the tradition that Kidd buried his treasure there. Burton states that Kidd was here, but others aver that there is no evidence

to that effect (see R. Burton, *Zanzibar: City, Island, and Coast*, 1872, and, for the opposed view, F. B. Pearce, *Zanzibar*, 1930). The only other tn. of any importance is Weti, which has been developed in the hope of finding a substitute for the insalubrious Chaka. The people still retain a kind of bull-fighting. It is said that witchcraft and the cult of devil-worship still prevail in P., and that sorcery and black magic have a hold on the bulk of the people. The few Europeans are gov. officials and members of missions. The gov. maintains a wireless station on the is. P. was sighted by Vasco da Gama on his epoch-making voyage from Lisbon to India in 1497. It has shared the fortunes of the E. coast in its earlier hist.; in 1627 it was involved in the general rising against the Portuguese following a massacre of Christians at Mombasa. Area, 380 sq. m. Pop. 114,900. See J. E. E. Craster, *Pemba: the Spice Island*, 1913.

Pemberton, Henry (1694-1771), Eng. physician, chemist, and promoter, b. in London, pupil and friend of Boerhaave at Leyden. He became prof. of physic at Gresham College, London. P. contributed papers to *Philosophical Transactions* (see vols. xxvii.-lxii.), one of these winning him Newton's friendship. He superintended the third ed. of the *Principia* (1726) for the latter. P.'s works include *View of Newton's Philosophy* (1728); *Lectures on Physiology* (1733); and *Lectures on Chemistry and Physiology* (ed. by J. Wilson, 1771, 1779).

Pemberton, Sir Max (1863-1950), Eng. novelist, b. at Birmingham. He joined the staff of *Vanity Fair* in 1885; ed. *Chums* from 1892 to 1893, and *Cassell's Family Magazine* from 1896 to 1906. *The Diary of a Scoundrel* (1891) was his first novel. Among others are *The Iron Pirate* (1893); *Eto* (1900); *Pro Patria* (1901); *My Sword for Lafayette* (1906); *War and the Woman* (1912). P. also wrote *The Finishing School* (a play) in 1904. Later works: *Prince of the Palus Royal* (1921); *Paulina* (1922); *The Mad King dies* (1928); *Life of Sir Henry Royce* (1931); and *Sixty Years Ago and After* (1936).

Pemberton, S.W. suburb of Wigan, Lancashire, England, forming four wards of the city. It is engaged in cotton spinning and coal mining.

Pembrey, coastal vil. of Carmarthenshire, S. Wales, 5 m. from Llanelly. Pop. 1700.

Pembroke, Earl of, see **AYMER DE VALENCE**.

Pembroke, Mary, Countess of (1557-1621), Eng. poetess, b. at Ticknell, near Bewdley, was the sister of Sir Philip Sidney, and became the countess of Pembroke on her marriage with Henry Herbert, earl, of Pembroke (c. 1577). It was at her suggestion that Sir Philip Sidney wrote his *Arcadia*, and she was a patroness of Daniel, Ben Jonson, and other poets. She herself was the author of sev. poetical works and the translator of *A Discourse of Life and Death* (1592) from the Fr. of P. Moray. See life by F. B. Young, 1912.

Pembroke, William Herbert, third Earl of (1580-1630), Eng. court dignitary and patron of letters, b. at Wilton, eldest son of Henry Herbert, second earl of Pembroke. Educated by Samuel Daniel of New College, Oxford, he succeeded as earl in 1601. He was disgraced for an intrigue with Mary Fitton (q.v.). Patron of Ben Jonson, Massinger, Wm. Browne, Inigo Jones, and others, he was also interested in the Virginia, N.W. Passage, Bermuda, and E. India companies. Lord chamberlain, 1615. Member of the Council of New England, 1620. He opposed the foreign policy of James I. and Buckingham. P. was lord chamberlain of the royal household, 1615-25; lord steward, 1626-30; and chancellor of Oxford Univ. from 1617. Pembroke College being named after him; he presented the Barocel library to the Bodleian. He wrote poems, issued with those of Sir Benjamin Rudyerd (1600). To him as lord chamberlain and to his brother Philip, the first folio of Shakespeare's works was dedicated in 1623, the inscription being to the 'incomparable pair of brothers.'

Pembroke: 1. Seaport in the co. of Pembrokeshire, Wales, on an inlet of Milford Haven. Its castle, in a good state of preservation, is an interesting building dating from Norman times. P. was formerly a gov. dockyard tn. It is now an R.A.F. flying-boat station and military garrison tn. Pop. 12,000. **2.** Suburb of Dublin, on the S.E. of the city. **3.** Cap. of Renfrew co., Ontario, Canada, on Lake Allumette in the Ottawa R. Pop. 6000.

Pembroke College, Cambridge, founded in 1317 by Marie de St. Paul, widow of Aymer de Valence earl of Pembroke, and known as Mary Valence Hall or Pembroke Hall. The chapel is the first college chapel in Cambridge; the new structure in the classical style is by Wren. The college has a master and twenty fellows. Past members include Ridley, Whitgift the younger, Pitt, Spenser, and Gray.

Pembroke College, Oxford, founded in 1621 on the site of an anct. seminary known as Broadgates Hall, by King James I., at the expense of Thomas Tredale and Richard Wightwick named after the earl of Pembroke, then chancellor of the univ. It has a master and ten fellows, of whom three are honorary. There are thirty-three scholars; the original foundation was for ten. Samuel Johnson was at P. See D. Maclean, *A History of Pembroke College, anciently Broadgates Hall*, 1897.

Pembrokeshire, maritime co. of S. Wales, and the westernmost co. of the principality, bounded on the S. by the Bristol Channel, and on the W. and N. by St. George's Channel. The R. Teify separates the co. on the N.E. from that of Cardigan. The chief bays are Milford Haven, St. Bride's, Newport, and Fishguard, with good anchoring ground. Since 1906 Atlantic liners have made Fishguard a port of call. Off St. David's Head, on the W. coast, are a number of rocky islets, called the Bishop and his Clerks. The shores on the S. are wild and in-

hospitable, and fronted by high precipitous cliffs. The surface is undulating; green hills alternate with fertile valleys. The prin. elevations occur in the Prescelly Mts., which traverse the N. of the co. from E. to W., and rise in their highest summit to the height of 1754 ft. The rivs. of the greatest importance are the E. and W. Cleddau, which unite and form a navigable portion of Milford Haven. There are many prehistoric monuments. Coal (principally anthracite), slate, lead, and iron are the only minerals worked. Oats, barley, and potatoes are the prin. crops. Cattle rearing is important. The co. returns one member to Parliament. Cap. Haverfordwest. Area 614 sq. m. Pop. 85,300.

Fennician, originally made by N. Amer. Indians and used as a food. It consisted of dried venison, from which all fat was removed. This was made into a paste and afterwards formed into cakes. At present, however, P. is used as a food on Arctic expeditions, and is made from beef instead of venison.

Femphigus, class of skin diseases characterised by blisters. The acute form is a bacterial infection.

Pen. The modern pen had its origin in the reed or calamus, which is still used for the purpose in the E. The anc. Egyptians, like the Chinese and Jap. of the present day, used a brush for writing, while the Romans and Gks. used the sharp point of the stylus to scratch their characters on waxen tablets. About the middle of the fourteenth century the quill-feather superseded the reed. Turkey quills were most often used, but swan quills were much valued, and crow quills for fine lines. Owing to the loss of time involved in mending the points of quill nibs, various attempts were made to give durability to them by gilding (Watt in 1818), and by attaching to them horn or tortoiseshell tips (Hawkins and Mordan). The only satisfactory substitute, however, was found to be the complete steel nib, which was first introduced in London in 1803 by Wise, and came into general use about 1830, when Perry, Mason, and Gilloft, of Birmingham, began to make them by machinery. Sometimes the steel is alloyed with silver, platinum, or rhodium, but this greatly increases the expense, while a gold nib with a ruby at the tip has been found to be of great durability and almost perfect for writing. The fountain pen with a reservoir in its stem and a gold iridium pointed nib is now in general use, while the stylographic pen with a wire point instead of a nib is a development of an earlier pen used for writing music; ball-pointed Pns. are a recent development. The steel is prepared at Sheffield, but Birmingham is the centre of the pen trade in England. See W. Higgins, *Pen Practice*, 1948.

Penal Servitude. When transportation (*q.v.*) beyond the seas was abolished the form of punishment by P. S. was introduced in its place, the substitution, which began in 1853, being complete in 1857. P. S. was imprisonment and compulsory labour as regulated by the Penal Servitude

Acts 1853 to 1891; the term 'imprisonment,' as opposed to P. S., connoted confinement either with hard bodily labour for not less than six nor more than ten hours a day (for males over sixteen stone-breaking at one time or the treadmill, both of which were abolished some years before the abolition of P. S. and hard labour by legislation of 1948). Prisoners undergoing P. S. wore the distinctive broad arrow dress, and the task assigned was merely some form of useful work. The Prevention of Crime Act, 1908, introduced a third opposed term, viz. 'preventive detention,' which might be superadded to P. S. in the case of a 'habitual criminal' (see further under CRIMINAL LAW). The shortest term of P. S. which could be given was three years, which term could, by the Penal Servitude Act of 1891, be awarded in every case in which the court had power to pass a sentence of P. S. The maximum term was for life, but by good conduct some degree of remission might be earned, the convict being then granted a licence or ticket-of-leave. A court of summary jurisdiction (*i.e.* stipendiary magistrates and justices of the peace) could not, but most other courts having criminal jurisdiction, including bor. and co. sessions courts, could award a sentence of P. S. P. S. (and hard labour) was abolished by the Criminal Justice Act, 1918, the relevant provisions coming into force on April 18, 1949 (see Statutory Instrument, 1919, No. 139: Criminal Procedure, Criminal Justice Act, 1918 (date of commencement) Order, 1919).

Penal Statutes are those which impose a pecuniary penalty or some other form of punishment for the breach of their provisions. Sometimes the Crown, sometimes the person aggrieved, and sometimes a common informer may sue for the penalty, *e.g.* in 1931 an action was successfully brought to recover penalties against a defendant for keeping a cinema theatre open on Sunday. It is a rule of law that a P. S. must be strictly construed, and must not be extended to any case which is not clearly within both the spirit and letter of the enactment. Action under P. S. must, where no time is expressly limited, be brought within six months of the cause of complaint. The term is in particular applied to anti-Catholic measures in England and Ireland during the seventeenth and eighteenth centuries.

Penance (Lat. *penitentia*). In eccles. parlance this word is used for four distinct things: (1) a virtue, of which the chief acts or manifestations are contrition or sorrow for sin, and satisfaction or self-inflicted punishment in atonement for sin; (2) a censure, *i.e.* a punishment imposed by ecclesiastical law, and involving deprivation of spiritual goods; (3) the sacrament of confession (*q.v.*); (4) the satisfaction imposed by the priest in this sacrament.

Penang, Pulo Penang, or Prince of Wales Island, northernmost is. of the Straits Settlements, situated off the W. coast of the Malay Peninsula, at the N.

end of the straits of Malacca, about 360 m. N. of Singapore. It is 15 m. long by 8 m. broad, flat and fertile for over half its area, rising at 'the peak' to 2922 ft. The port and cap. is George Town, or P. on the E. coast. The prin. products, besides tin, which is dug at the base of the mt., are sugar, coffee, rice, pepper, cloves, nutmegs, coco-nuts, and areca nuts. Area 108 sq. m. Pop. (estimated, 1941), 245,200 (Chinese, 165,200; Malays, 41,200; Indians, 2400; and Kurassians, 2300). P. Settlement includes P. Is., the strip of mainland opposite known as Prov. Wellesley (area 280 sq. m.; pop. about 120,000) and, prior to 1935, the Dindings ter. (area 183 sq. m.; pop. 20,000). It is the emporium for much of the trade of Sumatra and the Malay Peninsula. The Is. was ceded to the E. India Company by the rajah of Kedah in 1785. By the pirate-suppression treaty of Pangkor (confirming the cession of Pangkor Is. and the Sembilan Is. to Britain), the strip of ter. on the mainland opposite P., known as the Dindings, also became Brit. and remained a part of the settlement of P. until its retrocession (mainly to secure uniformity of customs procedure) to the state of Perak in 1933. P. was made a separate presidency, of equal rank with Madras and Bombay, in 1805. In 1826 Singapore and Malacca were incorporated with it under Brit. government, P. still remaining the seat of government. (In 1936 the seat of government of the Straits Settlements was transferred to Singapore.) With the estab. of P. the trade of Malacca passed to it. But when Singapore was founded P. in its turn had to yield first place to the port with the superior strategic position and came to depend chiefly on the local trade. Once inconsiderable, that trade has become important with the development of tin mining and rubber planting in the adjacent Malay States, and the development of trade with neighbouring countries. In the Jap. invasion of 1941 P. was abandoned to the enemy in Dec. of that year, but was again in Brit. hands in Sept. 1945.

Penarth, seaport tn. of Glamorganshire, Wales, 4 m. S. of Cardiff. It is a pleasure resort, and has a fine esplanade and pier. There is a good harbour, and a trade in coal and oil. Pop. 17,100.

Penates were, among the anct. Romans, the gods of the household. They were supposed to be the presiding deities of the family life, and were worshipped by the family, the hearth being their particular shrine. There are generally considered to have been P. of public life also, and they ruled the welfare of the state. See also LARES.

Pencil: 1. Name given to the small brushes used by artists, whether made of hog's bristles, camel's hair, fitch, or sable. The larger brushes are sometimes set in a tin tube, and the smaller are generally set in quills of different sizes. The well-known black-lead P. is made of black-lead or plumbago. The finest plumbago is obtained from a mine in Cumberland. Some Ps. are filled with coloured chalk

instead of black-lead. The over-pointed P. is an instrument for using cylindrical pieces of black-lead, which are forced forward in the P. just so far as to allow them to be used without breaking. 2. In optics, the name given to the rays of light which converge to or from a given point. 3. In geometry, the figure formed by a number of lines which meet in one point, as the *axial P.*, the *flat P.*, etc. 4. Term used by sixteenth- and seventeenth-century heralds to describe a small pointed flag.

P.E.N. Club, The. Founded in 1921 by C. A. Dawson Scott, Eng. novelist. The first president was John Galsworthy, who was succeeded in 1936 by H. G. Wells. It is a world association of writers, editors, and translators, with centres in most caps., and its aim is 'to promote and maintain friendship and intellectual co-operation between men of letters in all countries in the interests of literature, freedom of expression, and international good will.' International congresses are held annually; the first in London in 1923, subsequently in U.S.A., France, Germany, Belgium, Norway, Austria, Poland, Holland, Hungary, Yugoslavia, Scotland, Catalonia, Argentine, France, Czechoslovakia, England (in 1941 during the Second World War), Sweden, Switzerland, Italy, and Scotland (1950). It has devoted much attention to problems of refugee writers and was appointed by the Home Office to advise on 'enemy alien' writers during the Second World War. International presidents after Wells have been Jules Romains, Maurice Maeterlinck, and Benedetto Croce; Eng. presidents after Wells have been J. B. Priestley, Henry W. Nevins, Storm Jameson, and Desmond MacCarthy. Headquarters in London; secretary of Eng. centre and of the International, Hermon Ould.

Penda (c. 577-655), king of Mercia (626-55), the champion of paganism against Christianity; he defeated the W. Saxons at Cirencester (628), annexing much of their land. With Cædwalla, he slew Edwin of Northumbria at Hothfield (633) (identified with Hatfield Chase). P. also conquered and slew Sigebert and Ecgbe, the E. Anglian kings, and Oswald (q.v.) of Northumbria at Maserfield (642). Finally, Oswy, king of Northumbria, killed P. in battle at Winward (655) (unidentified). See Bede's *Ecclesiastical History*; *Anglo-Saxon Chronicle*; T. Hodgkin, *The History of England from the Earliest Times to the Norman Conquest*, 1906; and F. M. Stenton, *Anglo-Saxon England*, 1943.

Pendant, long narrow flag, see BANNER; PENNANT.

Pendant, in Gothic architecture, an ornamental mass of stone hanging down or descending from the intersections of a groined vaulting. They are especially found in the florid Gothic type, as, for example, in Henry VII's Chapel at Westminster Abbey.

Pender, Sir John (1815-96), Scottish manufacturer and director of cable companies, b. in the Vale of Leven. P. was engaged in the manuf. of textiles before

he turned his attention to cables. He eventually took an important part in financing and managing the many companies which arose when the success of the Atlantic cable had shown the world its practical utility. He promoted cable enterprise in all parts of the world, and subsequently controlled companies whose combined capital was over \$15,000,000 and who owned 74,000 nautical m. of cables. He represented Wick Burghs in Parliament for sev. years.

Pendine, vil. of Carmarthenshire, Wales, situated on Carmarthen Bay, 5 m. from Laugharne. There is a fine stretch of sand, which is used for motor-car speed tests.

Pendleton, formerly a separate tn. of Lancashire, Eng., 2½ m. W. of Manchester, was in 1919 included in Salford. Manufs. silk and cotton.

Pendulum, instrument of great value in physics. A simple P. is defined as a heavy particle suspended from a fixed point by a fine, inextensible, massless, rigid thread so that it is free to oscillate in a vertical plane. Naturally an ideal P., its motion is nevertheless of great importance in the investigation of problems concerning real or compound Ps. When Galileo timed the oscillations of a swinging lamp at Pisa by means of his pulse he was observing an approximation to a simple P., and he discovered that the oscillations were isochronous. Mathematical calculation obtains the formula $t = 2\pi\sqrt{l/g}$ for a complete oscillation of a simple P., where t is the time, l the length of the P. and g the acceleration due to gravity at the place where the P. is situated. This formula is true only for a small arc of swing. From this law, knowing g at any place, we can construct a pendulum to beat any required time, or can determine what time a given P. will beat, or by arranging length and observing time we can find the value of g . This last is of great importance: $g = 980$ when the P. beats secs., or 9.8066 the length of the secs. P.; this must be increased by $\cos^2 \theta / 289$, θ = latitude, owing to centrifugal force of rotation of the earth. Thus at London, $g = 32.121$ (Sabine); New York, 32.160 (Sabine); Edinburgh, 32.204 (Kater); Rawak, 32.088 (Freyinet); Spitzbergen, 32.253 (Sabine). From this and other results it is found that gravity increases towards the poles and is least at the equator; an independent proof of the spheroidal shape of the earth. If w = loss of weight between equator and pole, c = centrifugal force at equator, both expressed as fractions of g at the equator, d = ellipticity of the planet, then $d + w = 2\frac{1}{3} \times c$ (Clairaut, 1742), whence $d = .1$ about. The density of the earth was found by means of a P. by Maskelyne in 1774; again in 1832 at Arthur's Seat, Edinburgh, by determining the attraction from the vertical due to mt. mass; again by comparing oscillations at surface and bottom of a mine by Ayr in 1856. Conversely, the height of a mt. or the depth of a mine may be determined. If r = radius of the earth and d = difference in

number of oscillations per day, the height = $r.d/864$ ft. Foucault, in 1851, by means of a P., rendered the rotation of the earth visible. The P. appeared to alter its swing direction regularly; the law is: the total angle described by the plane of the P. in a day = $360^\circ \sin \theta$, where θ is the lat. If a simple P. swings in a horizontal circle, instead of a vertical plane, describing a cone, its time = $2\pi\sqrt{l/g}$, where l = height of cone. No pendulum is mathematically simple, and the determination of length is not easy.

Kater's pendulum is a brass tube 4 ft. long, 3 in. diameter, one end weighted. Parallel knife edges are inserted at right angles at equal distances from the ends and the whole apparatus is so adjusted that the times of swing will be equal and not far from one second when swung either end up. The length between the knife edges gives the simple-equivalent P. All Ps. practically used are compound; defined as a rigid body oscillating about a fixed horizontal axis. The time of oscillation is given by the formula $t = 2\pi\sqrt{\frac{k^2 + h^2}{gh}}$, where k is the radius of gyration of the P. about an axis through its centre of gravity parallel to the axis of oscillation, and h is the distance between the centre of gravity of the P. and the point of suspension. Thus the length of the simple-equivalent P. is $\frac{k^2 + h^2}{h}$. Fig. 1 is a body (i.e. a compound P.) suspended at O, G its centre of gravity; then K, a point in the line passing through O, such that if K be made the point of suspension the time of oscillation is not changed, is called the centre of oscillation and also the centre of percussion (q.v.). The length OK equals the length of the equivalent simple P.

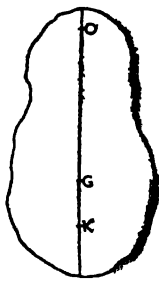


FIG. 1

Blackburn's pendulum (Fig. 2) is a contrivance arranged for tracing, by means of ink trickling from the bob, various harmonic curves. The mass M is suspended at S and S' by a string knotted to two others at K. The mass moves on a curved surface, the prin. curvature at the lowest points being $1/PM$ and $1/KM$; its motion is therefore compounded of the two simple harmonic motions $2\pi\sqrt{PM/g}$ and $2\pi\sqrt{KM/g}$ for small oscillations.

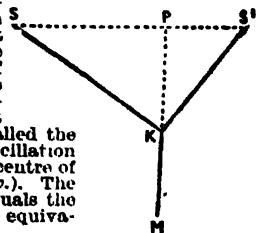


FIG. 2

Balistic pendulum is a P. formerly used for measuring velocities, such as that of a bullet, and for testing gunpowder. A mass of wood forms the 'bob,' and swings backwards when the bullet is fired into it, so that no jar is given to the pivot or point of suspension. The momentum in the bullet before entering the wood now belongs to the whole mass, of which it becomes a part. A silk ribbon attached to the bob is pulled over the edge of a table or through a moderately tight hole by the swing, and the length pulled through is proportional to the momentum of the bullet before entering the wood. The velocity is obtained by dividing the mass of the bullet into the momentum. The device was invented by Robins (1740) and has been improved. The gun itself may be suspended as a P. and the arc of recoil measured, small arms are thus tested by the 'gun éprouvette.' See also under **HORLOGY**.

See any standard book on dynamics for elementary work. S. L. Loney, *Elements of Dynamics*, 1893; C. J. L. Wagstaff, *Properties of Matter*, 1920. For advanced work: N. F. Ramsey, *Dynamics*, J. H. Poynting, and J. J. Thomson, *Properties of Matter*, 1903; C. S. Jackson and W. H. Roberts, *First Dynamics*, 1913; and C. J. L. Wagstaff, *Properties of Matter*, 1934.

Penelope, in Gk. mythology, the wife of Odysseus and the mother of Telemachus, who was a baby when Odysseus left home to take part in the war against Troy. During her husband's absence, P. managed to escape persistent suitors by putting forward the excuse that she had to weave a robe for Laertes, her father-in-law, and to lengthen the task she undid by night her work of the day. Odysseus returned in time to save her from further annoyance. She thus figures in the *Odyssey* as the type of faithfulness, although some later writers are at variance with this view.

Penetangore, see **KINCARINE**.

Penge, urb. dist. and par. of Kent, England, 7 m. S.E. of London, on the S. Region Railway. Pop 2,000.

Penguin, common name of the members of a family Spheniidae, found only in the S. hemisphere, and characterised by the modification of the wings into paddles or flippers. The wing is long and has no covert or quill feathers, and always remains open. The feathers are tiny, with very broad shafts and but little vane or web. The legs of the birds are placed far back and in the water the feet are stretched out straight behind and held motionless, the wings working rapidly as if being used in flight. The position of the legs causes the gait of the birds on land to be very awkward, but on snow slopes they are able to toboggan at a rapid pace, propelling themselves with the powerful legs assisted by the wings. They stand upright, and this characteristic, with their solemn bearing and many curious traits, often gives them a remarkably human appearance. They are essentially aquatic birds, and their coming on shore is chiefly for the breeding

season, when they assemble in rookeries, whose number is estimated as 750,000 at Cape Adare. The nest is often no more than a slight hollow in the ground, but some Ps., especially the Adélie P., put themselves to a great deal of trouble to collect stones, with which they bank the nest round, an occupation which frequently develops thieving habits. Two eggs are laid, and both birds, but chiefly the male, attend to their incubation. Both parents are very devoted to the young, one always staying to guard them, the other bringing them, often at great labour, from the sea crustaceans and other small animals, which the young take by pushing their beaks far down their parent's throat. When they are old



PENGUINS

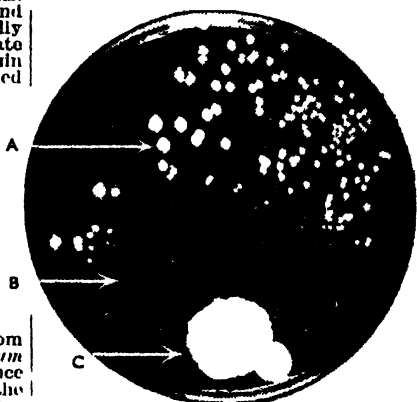
enough to move away from the nest, the relationships often become hopelessly confused. The moult of Ps. is remarkable in that the short, scale-like feathers are flaked off like the sloughing of a reptile's skin rather than the shedding of plumage. Some species of P. possess a pouch, in the form of a feathered fold of skin near to the feet on the ventral surface, used to shelter the eggs and young. With the exception of a single tropical species which inhabits the Galapagos Is., and a few others, Ps. are almost confined to the colder regions. Large rookeries have been found at very low latitudes. The largest species is the emperor P., which breeds far & during the winter darkness. It is about 3 ft. long, and the plumage is dark slate on the back and white on the underparts, with yellow spots on the head. The king P. occurs on Kerguelen Is., the Falkland Is., and others of about the same lat., 50° S. With it is generally found the Gentoo P., the feet of which, as well as the lower mandible and lower part of the upper mandible, are bright yellow. The eggs are palatable, and are taken in great numbers by sealers and whalers. See also under **ANTARCTIC**

Penguin Books. This enterprise was founded in 1935 by Allen Lane (nephew of the famous Victorian publisher, John Lane of the Bodley Head) and his two brothers, John and Richard. Its original aim was to provide low-priced reprints of good fiction in large popular eds. The venture met with rapid success, and within two years more than one hundred titles had been issued as Penguins at a price of sixpence a vol. In 1937 a complementary series, Pelican Books, was begun in order to develop 'the diffusion of knowledge' through cultural and scientific books. This series includes a substantial and increasing proportion of vols. specially written as Pelicans. Many other separate series now appear under various Penguin imprints, among them the illustrated King Penguins, the Penguin Classics (in new translations), the Puffin Books for children, the Penguin Modern Painters (with colour plates), the Penguin Shakespeare, the Penguin Music Scores, etc. More than half the output of P. B. Ltd. consists of vols. written expressly for one or other of the series and not pub. in any other form. In its first fifteen years of existence 1500 titles were issued in an aggregate output exceeding 15,000,000 copies. *Penguin's Progress*, a quarterly, records the activities of the firm.

Pengwern, see SHREWSBURY.

Penicillin. The name is derived from the green mould or fungus *Penicillium* (Lat. a brush, referring to the appearance of the spore-bearing branches under the microscope); various species of *Penicillium* are common on decaying and damaged fruit such as oranges and on cheese. In 1928 a culture of *Staphylococcus* bacteria growing in the laboratory of Prof. (now Sir) Alexander Fleming (q.v.) was observed by him to be contaminated with a colony of *Penicillium*, later identified as *P. notatum*. Fleming noted that the growth of the bacteria was retarded close to the mould, and subsequent experiments showed that the inhibitory action was exerted on other bacteria, such as the haemolytic *Streptococcus* and the organisms of pneumonia, gonorrhoea, and diphtheria. On the other hand there was no effect, for instance, on the bacteria of tuberculosis, influenza, and *Bacillus coli*. During the Second World War, the effective material P. was obtained in a relatively pure and stable form by the Oxford workers under Sir Howard Florey and Dr. E. Chain, and was produced in the U.S.A. and in England for the treatment of service personnel and later of civilians. In 1918 the chemical composition of various forms of P. was pub., and attempts at synthesis have been made. Fleming's original strain of *P. notatum* remained the commercial source until 1945, when another strain was used. P. is particularly useful as an antibacterial agent since it is non-poisonous even in large doses, in contrast to such drugs as salvarsan and the sulphonamides. Other fungi have since been investigated to ascertain whether they contain similar substances; streptomycin, useful in some kinds of tuberculosis, has been extracted

by Waksman (1944) from *Streptomyces griseus*, and chloromycetin, also from a species of *Streptomyces*. Chloromycetin, synthesised in 1949, is proving of value in the treatment of scrub typhus and other diseases, as is also aureomycin. Fleming's original paper was in the *British Journal of Experimental Pathology*, 1929, 10, 226. See G. Lacken, *The Story of Penicillin*, 1945; Sir A. Fleming, *Penicillin: its Practical Application*, 1946; and National Academy of Sciences, *The Chemistry of Penicillin*, 1949.



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PFENICILLIN: THE ORIGINAL PLATE

The staphylococci planted on the plate had developed into the fully formed colonies seen at A. The mould C developed from a spore which fell on the plate after the colonies had grown up. The mould produced penicillin which destroyed the staphylococcus colonies in the area B, the nearest ones completely, and those further out remain only as shadowy remnants.

Peninsula, piece of land jutting out into, and almost surrounded by, the sea. It differs from a cape in that it is reconnected to the mainland by an isthmus.

Peninsular and Oriental Steam Navigation Company, commonly called The P. & O., was incorporated under that title in 1840. Since 1837 the Peninsular Company running to Spain and Portugal had been in operation, and with the inauguration of a regular mail service by the company to India the 'Oriental' was then added. Their first ship was the *William Faucett* of 206 tons, chartered for the purpose, as was the *Royal Tar*, built in 1832. Prior to the opening of the Suez Canal passengers and cargo had to be transported across the isthmus to the steamer waiting them at Suez, and the route, originally opened up by Thomas Waghorn, developed under P. & O. control to an extensive business with special Nile steamers, coaches between Cairo and Suez, with rest houses, and many thousands of camels for the cargo. The Australian

mail service was started in 1852, and other routes extended to China, Japan, and the Black Sea. The opening of the canal in 1869 naturally disrupted the whole elaborate organisation and caused difficulties over the mail contract; but the company continued to prosper, its vessels increasing gradually in size and speed. In the early 1900s they were exceeding 10,000 tons in size. In 1912 came fusion with the Brit. India Steam Navigation Company, who possessed one of the world's largest fleets, and later control of well-known lines like the New Zealand Shipping Company, the Union Company of New Zealand, the General Steam Navigation Company, the Hain Line, and the Strick Line.

To-day many P. & O. ships exceed 20,000 tons, like the well-known *Strath* class, the *Himalaya* of 28,000 tons, put into service in 1949 being the biggest. Heavy war losses from 1939 to 1945 caused great delay in the resumption of normal services, but to-day, by means of a greater sea speed, the company is endeavouring to make up for its lack of ships by faster voyages. Cargo liners of 7000-9000 tons, each taking twelve passengers, are being run at 17 knots, whilst passenger ships are running at from 19 to 22 knots. On Jan. 1, 1950, the P. & O. had twenty-nine ships in service, totalling 386,000 tons, with two ships of 33,000 tons building. The tonnage of the P. & O. group of associated lines totalled over 2,000,000, with 288,000 tons still under construction. See *Boyd Cable, A Hundred Year History of the P. & O., 1837-1937, 1937*.

Peninsular War (1808-14). The continental system (*q.v.*) of Napoleon had been accepted by all the nations of Europe with the exception of Portugal, and Napoleon's schemes of oriental conquest required a maritime base. Therefore in Oct. 1807 the emperor concluded the secret treaty of Fontainebleau for the conquest and partition of that country with the king of Spain, no doubt planning the acquisition of the latter state also. In the following month the Fr. army under Junot seized Lisbon, and the Portuguese royal family sailed to Brazil. Before March of the following year, Napoleon had dispatched nearly 160,000 more men into Spain, ostensibly to reinforce Junot; riots then broke out in Madrid against Charles IV., who abdicated in favour of his son Ferdinand VII. The latter, however, left Madrid for France, where he was held a prisoner, and Charles again occupied the throne, until on May 5 he surrendered the crown by the treaty of Bayonne to Napoleon, who bestowed it on his brother Joseph. This led to an insurrection in favour of Ferdinand VII., and in June 1808 Portugal appealed to England for aid. An expedition under Sir Arthur Wellesley sailed for Corunna on July 12, and Joseph quitted Madrid and retired to the R. Ebro. The Eng. troops, assisted by the insurgents, defeated Laborde at Rolica and Junot at Vimiero, and the latter was compelled to sign the convention of Cintra at Torres Vedras on Aug. 30, by which he evacuated Portugal and retired to France.

Napoleon had meanwhile consolidated an alliance with the tsar, and decided to lead the grand army into Spain in person. This he did, and entered Madrid on Dec. 4, 1808; Spain was, however, by no means subdued, and extensive guerrilla fighting took place. Sir John Moore (*q.v.*) conducted a well-planned diversionary movement, ending in a retreat to his ships at Corunna. Napoleon returned to France, and in the battle of Corunna on Jan. 16, 1809, the Eng. army was victorious, although it embarked afterwards, according to plan, and Sir John Moore was killed. There were now three theatres of war: in the E., in Portugal, and in Andalusia. In the first Lannes and Mortier besieged Saragossa, which surrendered Feb. 21, and St. Cyr invested Girona. In Portugal Soult occupied Oporto, but had to retire into Galicia; the Eng. under Wellington won the battle of Talavera, but Del Parque was defeated by Soult, with Victor, Sebastiani, and Mortier, at Albuera de Torres. During the winter of 1809-10, Wellington built the lines of Torres Vedras, forming an invincible position between the Tagus and the sea. In 1810 Masséna moved against Wellington, but was checked at Busaco, and Wellington retired behind the lines of Torres Vedras. Meantime Ney had captured Ciudad Rodrigo and Almeida. In Andalusia the Fr. took Granada, Málaga, and Seville, and besieged Cadiz. In 1811 Masséna, isolated by 'scorched-earth' tactics and the impregnability of the Torres Vedras position, retreated from his winter quarters at Santarém to Salamanca, pursued by Wellington, who defeated him at Barrosa, and later (May 3 and 5), at the battle of Fuentes de Oñoro. Soult came to the assistance of Masséna and, though defeated at the battle of Albuera (May 16), obliged the allies to raise the siege of Badajoz. In 1812 Wellington had been reinforced, and captured Ciudad Rodrigo on Jan. 19, Badajoz on April 6, and Almaraz Bridge on May 17. After defeating Marmont at Salamanca (*q.v.*), he entered Madrid and then besieged Burgos; Soult, however, raised the siege, and forced Wellington to retreat into Portugal. Meantime, in the E. of the country Suchet had captured all the towns save Alicante and Cartagena between 1810 and 1812, and had defeated Blake at Sagunto in 1811. In 1813 Wellington began to take the offensive, as the withdrawal of troops which was necessitated by the Fr. disaster in Russia left Joseph with only about 72,000 men against 100,000. Joseph was beaten at Vitoria on June 21, and fled into France. Soult immediately returned from France to take command, but could not prevent Wellington from capturing San Sebastian (Sept. 31), crossing the Bidasoa into France (Oct. 7), and taking Pamplona (Oct. 25). From this time the hist. of the war is the gradual weakening and continued defeats of Soult: in Nov. the Nivelle was crossed, in Dec. there was fierce fighting in front of Bayonne, and on April 10 the battle of Toulouse ended in Wellington's capture of the city, whilst on April 18 Soult signed a convention for

the suspension of hostilities. Soult displayed great skill and admirable firmness and tenacity in this last campaign, and was beaten because opposed by a greater general who had better troops.

The reasons for Wellington's success, which are also the reasons for the Fr. failure, may be briefly summarised as follows: Wellington's line tactics proved the answer to the Fr. system of attack in heavy columns; his supply system was superior; the Fr. operations covered too large an area and were not sufficiently controlled by a central authority on the spot; Napoleon's system of conducting the war in Spain from Paris was fundamentally unsound; the guerrillas greatly hampered the Fr. On the other hand, Wellington had to contend against lack of money, Sp. intrigues, and lack of equipment, particularly of engineers for siege work. The P. W. proved a continuous drain upon Fr. resources, as Napoleon himself admitted. Moreover it gave a new hope to the defeated countries of Europe, in that Wellington proved the Fr. system of warfare to be by no means the invincible weapon it had for so long seemed to be. The best hist. of the war is C. W. Oman, *Peninsular War, 1802-1811*. See also W. Napier, *History of the Peninsular War, 1808-40*; Lt.-Col. Gurwood (ed.) *Wellington's Despatches, 1811*; W. Tomkinson, *Diary of a Cavalry Officer, 1891*; A. I. Shand, *The War in the Peninsula, 1808*; J. B. Jourdan, *Mémoires du Maréchal Jourdan (guerre d'Espagne), 1899*; F. Beaton, *With Wellington in the Pyrenees, 1911*; and B. D'Urban, *Peninsula Journal, 1930*.

Peninsula State, see FLORIDA.

Penis, intromittent organ, or phallus, of the male animal, whereby the sperm, which later fertilise the eggs, are transferred to the vagina of the female during the mating process (coitus or copulation). A P. is present in some invertebrates, such as the common earthworm, and particularly in parasites, as for instance the tapeworm, where it facilitates fertilisation inside the body of the host. Fertilisation is usually external in fishes and amphibians, so that a P. is absent, but in some fishes, such as the viviparous tropical species, and also the common dogfish, a copulatory organ occurs, though it is not usually known as a P. Amongst reptiles a paired P. is found in the snakes and lizards; in birds, such as the domestic fowl, the sperm is transferred by the juxtaposition of the cloacal apertures during coitus, and there is no P. In man, an example of the mammals, the P. is a cylindrical organ which terminates in the glans, the latter covered by the prepuce or foreskin; internally the P. contains three spongy masses: the two corpora cavernosa dorsally and the single corpus spongiosum ventrally. The corpora become engorged with blood and cause the erection of the P. in copulation; the corpus spongiosum is traversed by the urethra, the passage for the urine.

Penistone, mkt. tn. in the W. Riding of Yorkshire, England, on the R. Don. 13 m. N.W. of Sheffield. Agriculture and

the manuf. of steel goods are the chief industries. P. is the head of the P. parl. div., and also head of a co. council div. Pop. 6000.

Penitential Psalms, seven psalms of a penitential character chosen from the O.T. and usually associated together. They are Psalms vi., xxxii., xxxviii., li., cli., cxxx., cxlii., of which Psalm cli., *Miserere*, is the most striking. Their selection dates back to the third century at least. They are also frequently used as an act of private devotion.

Penitentiary, one of the offices of the papal court. The name *Penitentiarius* is also given to the cardinal who presides over this court. The office of the P. is concerned with all questions relating to the confessional and private discipline. It deals with applications for the remission of eccles. censures, and for dispensations from the ordinary marriage laws of the church, and with specially reserved cases of conscience. Meetings for the settlement of these cases are held monthly, and, if necessary, they are then referred directly to the pope. See also PRISONS.

Penkridge, tn. of Staffordshire, England, 6 m. S. of Stafford. It is generally accepted as the Rom. Pennocrucium. Pop. 2400.

Penley, William Sydney (1852-1912), Eng. actor, b. at Margate; began life as a choir-boy, and then became a clerk in a drapery business. In 1871 he went on the stage, and soon after achieved success as the foreman in Gilbert and Sullivan's *Trial by Jury*. His position steadily improved until he played the curate in *The Private Secretary*, when he took his place as the leading London low-comedy actor. In 1892 he produced *Charley's Aunt*, and drew crowds to see the play and his delightfully humorous performance. The play brought him a fortune.

Penmaenmawr, seaside resort of Wales, in Carnarvonshire, on Conway Bay, 4 m. W.S.W. of Conway. To the W. of the tn. rises the height of P. (1550 ft.), on whose crest was, until 1920, a hill fort and Druidical remains. Pop. 4500.

Penn, Sir William (1621-70), Brit. admiral, b. probably at Bristol, served under Blake in the Dutch war, and was in command of the Blue Squadron at the battle off Portland (1653). In the following year he was appointed general and commander-in-chief of the fleet designed to proceed against the Spaniards in the W. Indies. Together with Gen. Venables, he tried to atone for his failure to take Hispaniola by the capture of Jamaica from the Spaniards (May 1655), the inhab. falling an easy prey to his ragamuffin army of 8000 troops in thirty-eight ships. Appointed naval commander-in-chief at Jamaica, he returned to England without leave and was imprisoned for a short term. He entered into negotiation with the Royalists, and at the Restoration was knighted, and made a commissioner of the navy. He had a command at the battle of Lowestoft (1665), but was not again employed on active service. There is a memoir by Granville P. and a portrait

in the hist. gallery of the Institute of Jamaica (Kingston). See *Penry's Diary*.

Penn, William (1644-1718), the Quaker founder of Pennsylvania, *b.* in London, was a son of Adm. Sir Wm. P. He was educated at Christ Church, Oxford, but was sent down from the univ. for non-conformity. He became a Quaker in 1667, and in the following year was imprisoned for publishing his *Sandy Foundation Shaken*. Released from the Tower in 1669 by his father's influence, he was perpetually persecuted for expressing his religious views. His father's death brought him a fortune and a claim against the Crown which he commuted for a grant of land in N. America, where he founded, in



WILLIAM PENN

1682, the colony of Pennsylvania for persecuted religionists. He was in England from 1684 for fifteen years and took an active part in religious controversy. His friendship with James II. brought some advantages to the Quakers. A second visit to his colony (1699-1701) gave it much useful legislation. The closing years of his life were clouded by mental decay. His works were collected in 1726, and ed. with a jour. of his life, by J. Beese. See biography, 1872, by W. H. Dixon, who refutes the charges of scandalous conduct detailed by Macaulay; and lives by S. M. Janney, 1852; J. Stoughton, 1882; A. C. Thomas, 1895; Mrs. C. Grant, 1908; J. W. Graham, 1916; and W. I. Hull, 1937; also H. M. Jenkins, *The Family of William Penn*, 1899, and L. V. Hodgkin, *Guelma, Wife of William Penn*, 1947.

Penn, Upper and Lower, two pars. of Staffordshire, England, 2 m. S.W. of Wolverhampton, engaged in the manuf. of hardware. Pop. (Upper) about 3000; (Lower) about 300.

Pennalism, see **FAGGING**.

Penn-names, see **PSEUDONYM**.

Pennant, Thomas (1726-98), Eng. zoologist and traveller, *b.* at Downing in Flintshire. He was educated at Wrexham School and subsequently at Oxford. In 1766 he commenced the pub. of his first great work, the *British Zoology*. In 1765, during the progress of this work, P. made a tour on the Continent. P. in 1771 pub. a *Synopsis of Quadrupeds*. He followed the arrangement conceived by Ray, introducing the genera estab. by Linnaeus. The *Synopsis*, when enlarged, was repub. under the title of *A History of Quadrupeds* (1781). After his return to England, P. commenced a work on *Indian Zoology* (2nd ed. 1790), of which fifteen folio plates were pub. The next work which P. commenced was a systematic catalogue called the *Genera of Birds*, but it was never completed. His last great work was his *Arctic Zoology* (2 vols., 1781-87). He also wrote a number of works of travel, including *Tours in Scotland* (1771-75) and *Wales* (1778-81). See his *Literary Life*, 1793.

Pennant (a compromise between 'pendant' and 'pennon'), general name for most pointed flags which are long in the fly as compared with the hoist. A signal P. is 9 ft. long, and tapers from 2 ft. at the mast to 1 ft. at the end. The nautical P. is a swallow-tailed flag, about twice as long as it is broad, flown at the mast-head of a ship in commission. A broad P. is flown to show the ship of a commodore. The paying off P. is a very long streamer with a bladder at the end, and is flown by a ship on its return to port. Special flags flown at church times, meal times, etc., are also called Ps. Ps. were attached to a knight bachelor's lance; later they were used in Brit. lancer regiments, and on section-leaders' vehicles in armoured car regiments. Brit. mail-carrying air-liners also carry Ps.

Pennatula, **Sea Pen**, or **Sea Rod**, genus of coral polypes of the order *Aloyonaria*. A fairly common Brit. species is *P. phosphorea*, so called from its phosphorescent character, though this is possessed by other species.

Pennell, Joseph (1857-1926), Amer. artist and author, *b.* in Philadelphia. In 1884 he married Elizabeth Robins, with whom he collaborated in producing numerous books of travel and description, amongst which are *Our Sentimental Journey through France and Italy*; *A Canterbury Pilgrimage* (1885); and *Our Journey to the Hebrides*. They were close friends of the artist Whistler, whose biography he pub. in 1908.

Pennine Alps, important div. of the Central Alps, which extend from the Great St. Bernard Pass eastward to the Simplon Pass, the Rhone forming their N. boundary. The name Pennine is often not applied to the W. portion, from the Little St. Bernard Pass to Col Ferret, which is called the Chain of Mont Blanc. In the P. A. are the Combin dist., the Arolla dist. (a favourite summer resort for climbers and tourists), the Zermatt dist., and the Saas dist. Amongst the highest

peaks found in the range are Mt. Vélán (12,353 ft.), Grand Combin (14,160 ft.), Mont Blanc de Sallion (12,695 ft.), Tête Blanche (12,300 ft.), Dent d'Hérans (13,710 ft.), Grand Cornier (13,020 ft.), Matterhorn (14,781 ft.), Monte Rosa, highest peak Dufourspitze (16,215 ft.), etc.

Pennine Chain, mt. group of England, beginning to the S. of the Lower Tyne valley and extending to the middle of Derbyshire and the N. of Staffordshire. It is sometimes called the 'backbone of England,' but is more in the nature of a series of uplands than a chain of mts. The chief summits are Cross Fell (2930 ft.), Wharfedale (2414 ft.), Ingleboro (2373 ft.), Pen-y-ghent (2273 ft.), and Kinder Scout (The Peak) (2088 ft.).

Pennisetum, genus of ann. and perennial grasses, some of which bear very decorative inflorescences with long awns or bristles, and an abundance of ornamental foliage. *P. latifolium* and *P. longistylum* are grown in gardens. *P. typhindum*, spiked millet, is an Indian cereal, and *P. cenchroides* a valuable tropical fodder grass.

Pennon, see FLAG; PENNANT.

Pennsylvania, known as the Keystone State, one of the thirteen original states of the U.S.A.; sends to Congress two senators and thirty-four representatives, and is the second largest as regards pop., which was estimated at 10,676,000 in 1948. It is about 160 m. wide and 362 m. long. Gross area, 45,339 sq. m., of which 294 sq. m. is water surface (excluding Lake Erie). Harrisburg is the cap., and P. is bounded on the N. by New York and Lake Erie, on the E. by New York and New Jersey, on the S. by Delaware, W. Virginia, and Maryland, and on the W. by W. Virginia and Ohio. This state is one of the richest mineral regions in the world, and ranks first in the U.S.A. with a production worth 11,090,784,000 in 1946. There are immense bituminous coal-fields and also large fields of anthracite coal, which together form 80 per cent of the value of mineral products; the great oil-fields lie in the W. of the state. Petroleum was first discovered in 1859; boring for it is one of the great industries of P., ann. production reaching over 12,000,000 barrels. The state leads in the manuf. of pig-iron, Pittsburgh being the centre of the smelting industry. Besides iron and steel products, there are electrical goods and equipment. The state as a whole comes next to New York in its industries, the ann. output reaching a value of \$5,473,000,000 in 1939. It produces nearly half the vast amount of steel made in the U.S.A. The leading manufs. are pig-iron and steel, foundry and machine-shop products, leather and silk, and worsted goods. There are large sugar and molasses refineries, also petroleum. The climate is healthy but subject to extremes of cold and heat. One-fourth of the state is wooded, and lumbering is a source of wealth in the N. In the S. and S.W. are forests of hemlock and virgin beech. The great Cumberland valley is a fine farming dist. The farms are small but well tilled; hay is the great

crop, but wheat and other cereals are grown. Poultry farming is a source of wealth, and horses are raised in this state, and cattle, especially a fine though small breed of cows, similar to the Jersey cows in appearance. Over and above its industries, the state's agric. production has reached \$500,000,000 annually (in 1939 it was \$300,000,000), the farmers being mainly those descendants of Ger. settlers famous as 'P. Dutch.' The Appalachian range crosses P.; a part of the Alleghenies range, with Mt. Knobb as the highest summit, lies in the S.W., and between them and the Blue Ridge or Kittatinny Mts. are fertile valleys. Slate, limestone, and marble quarries abound, especially in the dist. round Philadelphia. The R. Delaware drains the whole of the E. part of the state, and runs into Delaware Bay, the sea entering the riv. for 30 m., thus forming an immense estuary. Other rivs. are the Susquehanna, with tribs., West Branch and Juniata, and in the W. the Allegheny R. and the Monongahela unite forming the Ohio.

The univs. and colleges are the univs. of P. (founded 1740), and of Pittsburgh (1787), P. State College (1855), Swarthmore College (Quaker) (1864), Carnegie Institute of Technology (1900), Temple Univ. of Philadelphia (1884), Drexel Institute (1891), Lafayette College (1832), Bryn Mawr College for Women (1835), and Lehigh Univ. (1866). The prin. religious denominations are Rom. Catholic, United Lutheran, and Jewish.

Charles II. gave to Wm. Penn (q.v.) in 1680 large grants of land in this state, but the first settlers were Swedes, and once it was called New Sweden. The state took an active part in the revolution and the war of 1812, and also in the Civil war of N. and S., when its nearness to the field of action made its situation most dangerous. Had the battle of Gettysburg been a victory, the state would have been invaded by the S. army. Two famous strikes, in 1892 and 1902, had great economic influence on state affairs, and the panic of 1907 had an unfortunate effect in business quarters, and much money was lost and many banks failed.

The P. Railroad Company controls a considerable part of the railways of the state. The station or depot of this company at Philadelphia is over 700 ft. in length, and one of the finest terminals in America. Other railways are the Lehigh Valley, the Philadelphia and Reading, the Pittsburgh, Cincinnati, St. Louis, and Michigan Southern. In 1915 there were 9934 m. of steam railway and 2994 m. of electric. In 1947 there were 158 airports. There are three fine ports: Erie, on Lake Erie, with large domestic trade; Pittsburgh, conducting the Ohio R. trade; and Philadelphia. Prin. towns: Philadelphia (1,931,300), Pittsburgh (671,700), Scranton (140,400), Erie (117,000), Reading (111,600), Allentown (98,900), Wilkes-Barre (86,900), Harrisburg (85,900), Altoona (80,200), Johnstown (66,700), Lancaster (61,300), Chester (59,300), Bethlehem (58,500), Upper Darby (56,900), York (55,800), McKeesport (55,400). See S. W.

Pennypacker, Pennsylvania in American History, 1910; A. E. Martin and H. H. Shenk, **Pennsylvania History: Told by Contemporaries**, 1925 (London); G. P. Donehoo, **Pennsylvania, a History**, 4 vols., 1926; A. Pound, **The Penna of Pennsylvania and England**, 1932; S. J. and E. H. Buck, **The Planting of Civilisation in Western Pennsylvania**, 1939; Federal Writers' Project (pub.), **Pennsylvania: a Guide to the Keystone State**, 1940; and O. S. Heckmann (ed.) **What to read about Pennsylvania**, 1942.

Pennsylvania Railroad, one of the greatest Amer. railway systems, comprises within its general organisation a main line and fifty subsidiaries with a total mileage of nearly 21,000, of which 1480 m. have been electrified. It was originally incorporated in 1846 for the purpose of building a line from Harrisburg to Pittsburgh within the state of Pennsylvania. This was completed in 1854 and then extended to Philadelphia in 1857. To-day it covers a vast ter roughly bounded by the Atlantic Ocean and the Mississippi R., its main lines running N. of the Mason and Dixon line, although it also penetrates S. of it. The bulk of the pop. and of the industries of the nation are enclosed in the ter. it serves. Most of the big cities within that ter. are reached by one or more of its lines. The Pennsylvania was one of the first to introduce all-steel cars. Trains enter its terminals (from New Jersey) in New York by a tunnel under the Hudson R.

Pennsylvania, University of, situated in the city of Philadelphia, U.S.A., is usually claimed to have been founded by Benjamin Franklin in 1740, though it would be truer to say that he initiated the movements which led to its foundation. To-day it is housed in magnificent buildings, has an endowment of \$17,500,000, has over 9500 students and more than 794 profs. It comprises academic, scientific, engineering, fine arts, medical, legal, and dental schools. Its library, containing more than 700,000 vols., possesses also a priceless collection of the papers of Benjamin Franklin.

Penny, most anct. of Eng. coins. First mentioned in the laws of Ine, king of the W. Saxons, it weighed then about $\frac{1}{16}$ of the Saxon pound weight. The Romans similarly divided the *libra* into 20 *solidi*, and the *solidus* into 12 *denarii*, i.e. 1 *denarius* = $\frac{1}{12}$ of a *libra* or pound. No halfpennies were comd before the late ninth century, and no farthings before the time of Edward I., the P. being deeply indented with a cross so that it could be broken into four parts. Under Edward VI. silver farthings ceased, and silver halfpennies under the Commonwealth. In 1662 'milled' edges were introduced to guard against clipping. In 1672 halfpennies and farthings were struck in copper and Ps. weighing one ounce *avordupois* in the same metal in 1797. These copper Ps. had the value of $\frac{1}{4}$ of an ounce of silver, but the bronze P. introduced in 1860, had only about half this value. The Ger. *pennig* was also originally silver, and bore the same relation to the Ger. pound of silver

as the Eng. P. to its pound. In the modern Ger. system the *pennig* is a copper coin. P. is colloquially used for 'cent' in the E. U.S.A.

Penny Banks. These were first estab. about 1850, and have since become very numerous, rising from 200 in 1880 to sev. thousand. In 1878 they received legislative sanction to the investment of their funds, and in 1904 came under the control of the Savings Banks Act. Their object is to furnish easy means to the thrifty, and especially children in schools, to accumulate savings from extremely slender resources. Considerable numbers of these banks are now in touch with the Post Office Savings Bank (*q.v.*), and P. B. form a branch of the activities of practically all the missions.

The Yorkshire Penny Bank, which is, however not controlled by the Savings Bank Act, has (1949) share capital authorised £1,750,000; share capital issued, £1,250,000; reserve fund, £1,250,000; and assets £98,572,211.

Pennyroyal (*Mentha Pulegium*), fragrant prostrate mint which grows in damp places on Brit. moors. It bears ovate, nearly smooth leaves and axillary whorls of reddish-purple flowers.

Pennywort, Wall, or **Pennyleaf**, name commonly given to *Cotyledon Umbilicus*, a succulent glabrous plant with thick round leaves compressed in the centre, where they are attached to the stem, and racemes of pendulous, greenish-yellow flowers. It occurs on walls and rocks. The marsh P. is *Hydrocotyle vulgaris*, a marsh umbellifer with round shilling leaves and minute inconspicuous flowers in simple umbels.

Penobscot, riv. of Maine, U.S.A., rising in Somerset co., and flowing E. into Chesuncook Lake, and then S. into Penobscot Bay, an inlet of the Atlantic Ocean. It is about 350 m. long and is identified with the mythical riv. Norumbega (*q.v.*).

Penobscot, tribe of N. Amer. Indians of Algonquin stock. They sided with the Fr. in the colonial war, but made a treaty with the Eng. in 1749, on whose side they fought during the war of Independence.

Penology, study of punishment or crime; or, in other words, that branch of criminology which deals more particularly with the deterrent and reformatory treatment of criminals. (The term is also used to describe the management of prisons.) P. marks a late stage in the hist. of legal codes. In anct. codes, the prevalent remedy is self-redress; all such acts as we should denominate crimes were remediable by private suit; there was nothing analogous to the conception of the vengeance of the community for acts tending to public alarm, nothing of the deterrent element in punishment, and still less of the reformatory or curative. The whole proceedings, even for a murder, were closely assimilated to a private lawsuit. The purpose of the criminal law, as it developed, was to supply the altruistic motives which were thus wanting. Gradually punishment becomes designed to make every offence 'an ill bargain to the offender'

(Locke); but it is only when we come to the time of Bentham (*q.v.*) and Beccaria (*q.v.*) that theories of punishment take a settled place in jurisprudence. These theories are generally classified into deterrent, preventive, retributive, and reformative. The last-named, which in process of time tends to occupy a more and more prominent place in the writings of jurists, but only to a limited extent in legislative expression, is the very antithesis of the retributive, which latter may be said to underlie most modern systems of punishment. In England such developments as the growing use of open prisons, and the whole system of Borstals and Approved Schools, as well as the institution of juvenile courts, are all expressions of the reformative element. The morbid theory of crime or, in the language of criminal anthropology, the assumption that every crime is the expression of a diseased mind, thus marks a conflict between law and medicine, and the old feud between the two professions touching the test of insanity (*see on this* MONAUGHTEN'S CASE, RULE IN) thus threatens to extend to the whole domain of crime. The conflict between the deterrent and reformative may be thus expressed: the deterrent changes the motives, the reformative, the character. Death, according to the reformative theory, can be no fitting remedy; imprisonment is the only important instrument available for its purposes. The strength of the reformative theory lies in the fact that the practice has been to deal with offenders on the assumption that they are ordinary types of humanity (*see on this* CRIMINOLOGY). It may be admitted without reserve that the emotion of retributive indignation, both in its self-regarding and its sympathetic form, is, even yet, the mainspring of the criminal law. The idea that the retributive element should have a place, but subservient to the deterrent, is not the only theory of retributive punishment: some hold that the retributive should be advanced to the first place among the various aspects of punishment: Kant, for example, holds that punishment cannot rightly be inflicted for the sake of any benefit to be derived from it either by the criminal himself or by society, and that the sole and sufficient reason and justification of it lies in the fact that evil has been done by him who suffers it. Kant regards punishment as in itself an evil which can be justified only as the means of attaining a greater good; retribution is itself not a remedy for the mischief, but an aggravation of it. A more definite form of the idea of purely retributive punishment is that of expiation. The expiatory theory conceives satisfaction as being due to the outraged majesty of the law rather than to the victim; but this is merely a further stage in the development of the primitive conception of self-redress and private vengeance. The expiatory theory, like Kant's theory, betrays an imperfect transmutation of redress into punishment. *See also* CRIMINAL LAW; CRIMINOLOGY; and as to the management of prisons,

see PRISONS. *See* Marquess of Beccaria, *Crimes and Punishments*, 1764; Jeremy Bentham, *Punishments and Rewards*, 1811; T. E. Holland, *Elements of Jurisprudence*, 1880 (13th ed., 1924); and Sir J. W. Salmond, *Jurisprudence* (2nd ed. 1907, 10th ed. 1947).

Penomping, *see* PNOMPENH.

Penrhyn, dist. of co. of Carnarvon, N. Wales. The Bethesda slate quarries in this locality yield large quantities of the mineral, and these are shipped from Port P. at Bangor.

Penrith: 1. tn. of Cumberland, England, situated in a picturesque spot, 17 m. S.E. of Carlisle. The tn. stands on the edge of the Lake Dist., 5 m. from Ullswater, and has the ruins of a castle built c. fifteenth century. At the Giants' Grave are twin sculptured crosses of late Saxon date; while the shaft is round, the upper part is square in section, and the type may have been derived from a preaching staff rod. There is also a grammar school. The inhab. are engaged chiefly in agriculture, though tanning and brewing are also carried on. Pop. 10,500. 2. Tn. of Cumberland co., New S. Wales, Australia, in the R. Nepean valley at the foot of the Blue Mts., 34 m. W. of Sydney. Pop. 4000.

Penrose, Elizabeth, *see* MARKHAM, MRS.

Penry, John (1559-93), Welsh Puritan, b. in Breconshire, and a student at both the univs. of Oxford and Cambridge. He was the chief writer of the 'Martin Marprelate' tracts, dealing chiefly with the abuses of the Church of England. He was bound, however, on account of his views, to retire into Scotland in 1590, and on returning to England three years later was condemned to death and hanged. *See also* MARPRELATE CONTROVERSY. *See* life by W. Pierce, 1923.

Penryn, municipal bor. of Cornwall, England, on Falmouth Harbour, 2½ m. N.W. of Falmouth. It ships granite and trades in coal, cement, grain, timber, etc. It has also boat-repairing yards and light engineering industries. Here is the site of the ant. Glasney College. Pop. 4000.

Pensacola, co. seat and port of entry of Escambia co., Florida, U.S.A., on P. Bay, an inlet of the gulf of Mexico, 50 m. E.N.E. of Mobile. Forts Pickens, McRae, and Barrancas defend the entrance to its excellent harbour. P. is a noted fish-market. Exports include fish, hides, and cotton. There is a naval air station here, one of the world's largest. P. navy yard is at Warrington, near by. The dist. is agro. and produces oranges. Pop. 38,000.

Penshurst, vil. of Kent, England, about 4 m. S.W. of Tonbridge. Sir Philip Sidney was b. at Penshurst Place (1554). The house, parts of which date from the mid-fourteenth century, was granted by Edward VI. to Sir Wm. Sidney in 1553 and it has ever since been the home of the Sidney family. The lofty baron's hall, dating from 1340, has a fine timbered roof supported by ten life-size figures in wood. The Elizabethan long gallery is hung with family portraits. P. Place is rich in portraits, especially of the sixteenth and seventeenth centuries, with

many important examples of the early Eng. school, though in many cases the names of the painters are not known. Among the portraits are those of Sir Philip Sidney and of Dorothy Sidney, afterwards Lady Sunderland, to whom, under the name of Sacharissa, Edmund Waller addressed many verses. Pop. 3000.

PENSIONS. The subject of old age P. has been fully dealt with under OLD AGE PENSIONS. This article is concerned with P. and superannuation allowances in the civil service and the Brit. armed services.

CABINET MINISTERS.—P. are payable when claimed by ex-Cabinet ministers. First class for those who held higher portfolios, £2000, and second class £1200. No pensions have been claimed since 1924.

CIVIL LIST PENSIONS are P. granted to persons distinguished in science, art, and literature, or their dependents in needy circumstances. A sum of £1200 is given each year.

CIVIL SERVICE.—P. and superannuation allowances to persons who have held civil offices in the gov. or civil service are regulated for the most part by the Superannuation Acts, 1834, 1859, 1873, 1887, 1892, 1919, and by the minutes and rules made under those Acts. It is to be noted that no civil servant has an absolute right to a pension, for not only does the Act of 1834 expressly save the power of the Treasury and heads of depts. to dismiss any person from the public service without compensation, but it has been judicially decided that a person employed in the public service, whether in a military or civil capacity, holds his appointment during the pleasure of the Crown unless there is some statutory provision to the contrary. The persons entitled to a pension under the above Acts as persons who have served in the permanent civil service are: (1) Persons holding their appointments directly from the Crown (Sec. 17, Act of 1859). (2) Persons admitted into the civil service with a certificate from the civil service commissioners (Sec. 17, Act of 1859). But under the Act of 1884 the Treasury may, on the application by the head of a public dept. make an order relieving any civil servant for want of a certificate where it is not by reason of his fault that he was appointed without one. (3) Persons in the Permanent Colonial Civil Service, in the Indian Civil Service, or serving in any imperial civil capacity in a colony (Acts of 1860 and 1887).

Other persons, though not *entitled*, may in certain circumstances be granted a 'compassionate gratuity': (1) The Treasury may grant a reasonable gratuity or ann. allowance to a civil servant who is injured without his own default in the actual discharge of his duty, and by some injury specifically attributable to the nature of his duty. If such person dies from injury, the pension may be granted to his widow, his mother if wholly dependent on him at the time of his death, and to his children. (2) The Treasury has a discretionary power to grant an allowance to a civil servant who is removed from his office on the ground of inability to dis-

charge efficiently the duties of his office; but the reasons for making such an allowance must be laid before Parliament in the Treasury minute granting it. (3) The Treasury may, if they think fit, grant a 'compassionate gratuity' not exceeding one pound or one week's pay (whichever is greater) for each year of employment to a civil servant who is not entitled to a pension under the Act of 1859, and who retires or is removed from his employment, and whose employment required him to devote his whole time to it, and whose remuneration was paid entirely out of moneys provided by Parliament; and further, who (a) if removed in consequence of the abolition of his employment or for the purpose of facilitating economical improvements in the organisation of his dept. has served for not less than seven years, or (b) if his retirement is due to mental or physical infirmity permanently incapacitating him from his duties, has served for not less than fifteen years. In regard to (3) the Treasury has power, on the application of the pensioner, to commute the pension by payment of a capital sum calculated according to the estimated duration of the life of the pension-holder.

In the ordinary course, a civil service pension is only payable on retirement at the age of sixty (retirement is only compulsory at the age of sixty-five), and a person superannuated under that age may be required to serve again under pain of losing his pension. This does not apply to any person under sixty who is incapable from mental or physical infirmity of discharging his duties, but such incapacity must be evidenced by a medical certificate and the Treasury must also satisfy itself of the genuineness of the case by independent inquiry.

The scale of P. is as follows: For ten years and under eleven years of service, $\frac{1}{10}$ of ann. salary and emoluments, for eleven years and under twelve years of service $\frac{11}{100}$, and so on up to forty years of service, when the full allowance of $\frac{1}{3}$ or one half may be granted (plus a lump sum or gratuity). This lump sum for men is computed at $\frac{1}{10}$ of salary for each year of service, subject to a maximum sum of 1. For women the pension is $\frac{1}{10}$ of salary for each year of service, subject to a maximum of $\frac{1}{3}$. The above are the benefits to civil servants who have completed not less than ten years' service and are given (i.) on retirement on reaching the age limit, or (ii.) on retirement for ill health, or (iii.) on retirement on abolition of office. On retirement for inefficiency after ten years or more service, payment may be made of such allowances as may be determined by the Treasury but not exceeding those for normal cases of retirement. There is also statutory provision for payment of benefits to legal personal representatives of civil servants on death in the service after completion of not less than five years' service (one year's salary or $\frac{1}{10}$ of salary for each year of service, subject to a maximum of $\frac{1}{3}$, whichever is the greater). But under the Act of 1899 the Treasury can, for computing the amount of the pension in certain cases,

add to the years of actual service any number of years not exceeding twenty, or conversely, direct that less than ten years shall qualify for a pension; this can only be done in the case of the appointment of a person holding professional or other special qualifications whom it has been declared by the Treasury to be in the interests of the public to appoint at an age exceeding that at which public service ordinarily begins.

NAVAL, MILITARY, AND AIR FORCE RETIRED PAY AND PENSIONS.—*Retired Pay and Service Gratuities for Commissioned Officers of the Armed Forces.*—The pre-1946 arrangements for retired pay and gratuities for commissioned officers were complicated and involved many differences both in rates and conditions of entitlement, not only between one service and another, but also between branches within the same service. It was therefore decided after the Second World War to introduce a new and simplified code of retired pay and gratuities which would be common to all three services and this was effected by the pay code of March 1946 (Cmd. 6750). The rates of retired pay and gratuities provided under the new code are, in general, substantially more favourable than the maximum rates attainable under the previous code (1940). In many branches of the armed forces officers not selected for promotion to the higher ranks have to retire at relatively early ages and retired pay is designed to provide a measure of compensation for such premature termination of career. The 1946 code provides a series of standard rates of retired pay which are granted to officers compulsorily retired, on reaching the compulsory retiring age, or earlier because they have not been selected for further promotion or because no further employment is available for them, subject to the completion of a prescribed period of service for each rank including not less than two years' service in that rank. For officers of the rank of admiral, general, or air chief marshal, the minimum period of service in the rank is only one year.

The full standard rates of retired pay are as follows:

	per year £
Lieutenant, R.N., captain, or flight-lieutenant	375
Lieutenant-commander, major, or squadron-leader	475
Commander, R.N., lieutenant-colonel, or wing commander	625
Captain, R.N., with less than 6 years' service in the rank, colonel, or group captain	825
Captain, R.N., after 6 years' service in the rank, brigadier, or air commodore	900
Rear-admiral, major-general, or air vice-marshal	1100
Vice-admiral, lieutenant-general, or air marshal	1300
Admiral, general, or air chief marshal	1500
<i>Half Pay</i>	
Admiral of the fleet, field marshal, or marshal of the R.A.F.	1800

Conditions of Award of Retired Pay.—The grant of retired pay, to officers retired otherwise than as invalids, is normally conditional upon completion of twenty years' service, but where in special cases, in the interests of the service, officers are entered at ages above that of the normal entrant, retired pay may be granted on compulsory retirement after not less than fifteen years' service. For invalided officers retired pay will be allowed provided that not less than ten years' service has been given. The minimum periods of total service from the age of twenty-one required for the full standard rate are as follows:

Standard rate appropriate to the rank of:	Minimum service after the age 21 required to qualify for the full standard rate	years
Lieutenant, R.N., captain, or flight-lieutenant		20
Lieutenant-commander, major, or squadron-leader		22
Commander, R.N., lieutenant-colonel, or wing commander		24
Colonel or group captain		26
Captain, R.N., brigadier, or air commodore		28
Rear-admiral, major-general, or air vice-marshal, or above		30

(Where an officer—other than an invalid—has completed less than the requisite minimum period of service in the rank, the rate of retired pay will be as for the next lower rank.)

Where the total service given is less than the period, according to rank, prescribed above, the rate of retired pay shown in column (a) is reduced by a deduction, at the rates shown in column (b), in respect of each year or part of a year by which the total service is less than the minimum period:

	(a)	(b) per year
Above £1000 a year		50
£1000 and above £800 a year		30
£800 and above £400 a year		20
£400 and above £300 a year		15
£300 and above £200 a year		10
£200 and below		5

The scheme outlined in this code does not apply to officers retired otherwise than in the normal course, e.g. for unsuitability, inefficiency, or misconduct, or who are cashiered or dismissed.

Retirement at own Request.—For officers permitted to retire at their own request it is not necessary to provide the same measure of compensation for loss of career. Officers allowed to retire at their own request, within six years before the compulsory retiring age for their rank and branch, will receive the rate of retired pay that would have been payable for compulsory retirement in the circumstances described above. Otherwise the rate of retired pay payable to an officer who is

permitted to retire at his own request before the age limit, will be the rate which he would have received on compulsory retirement less a deduction on the scale shown in the third table above for each year by which his age falls short, by more than two years, of the age limit, with a further deduction of 10 per cent of the resultant figure.

Gratuities.—Gratuities at the following rates are payable to officers holding permanent commissions who on retirement have completed insufficient service to qualify for the grant of retired pay: on completion of not less than ten years' service, £1000; for each complete year of service in excess of ten years a further £150. The maximum total gratuity is £2,350. Where an officer is permitted to leave the service, except on invaliding, after less than ten years' service, no gratuity is payable.

Rank.—Normally only substantive rank held on the active list will be taken into account in assessing retired pay under the new code. War substantive rank granted while on the active list under the special promotion arrangements in operation during the Second World War will, however, be allowed to reckon for this purpose. Provision will also be made for acting and temporary rank one step above substantive rank held under this wartime promotion scheme to qualify, on the lines of the existing arrangements, for increase of retired pay under the new code.

Service Pensions and Gratuities for members of the Forces below Officer rank.—The new pay code (Dec. 1945, Cmd. 6715) continued the existing system of granting P. to men discharged with certain minimum periods of service. Previously there was some difference of practice between the three services in regard to the length of service necessary to qualify for the award of a pension. To-day the service required to qualify (though not necessarily the term of a pensionable engagement) is the same, twenty-two years, in all three services (this does not necessarily mean that a man who has completed twenty-two years' service will be allowed to claim discharge to pension before the expiration of his engagement, though special provision is made for cases of invaliding). There is a basic scale of pension, common to all three services, for men completing this service. There is a higher scale of P. for men completing longer periods of service, e.g. thirty years or even thirty-seven years (it is not expected that in the R.N. and Royal Marines any men will serve so long as thirty-seven years; few serve so long as thirty years). This higher scale is common to the three services. The gov.'s aim in the new code was to provide a pension of the order of 34s. a week for the service man discharged to pension, in the rank of petty officer or sergeant, after twenty-two years' service. Men who complete a longer career in the forces will qualify for P. of greater amount in proportion to their length of service. The present P. scale for ratings and other ranks (except aircrew) is as follows.

(Army ranks only are quoted for the sake of brevity)

Rank Element	
Rank	For each year of service
Corporal	4d. per week
Sergeant	6d. " "
Staff-sergeant	9d. " "
W.O. 11.	1s. 0d. " "
W.O. 1.	1s. 3d. " "

Service Element	
Period of Service	For each year of Service
1st to 20th year	1s. 2d. per week
21st to 25th "	1s. 6d. " "
26th to 30th "	2s. 6d. " "
31st year onwards	4s. " "

Maximum Rates	
Leading seaman, corporal	70s. per week
Petty officer, sergeant	80s. " "
Chief petty officer, staff sergeant, flight sergeant	90s. " "
Warrant officer 11. and warrant officer 1. (army), warrant officer (R.A.F.)	100s. " "

Typical Rates	
Sergeant, 22 years' service (including 5 years as a corporal and 12 years as sergeant)	34s. 0d. per week
Flight sergeant, 30 years' service (including 7 years as a corporal, 7 years as a sergeant and 9 years as a flight sergeant)	55s. 11d. " "
Warrant officer R.A.F., 37 years' service (including 3 years as a corporal, 7 years as a sergeant, 7 years as a flight sergeant, and 13 years as a warrant officer)	97s. 4d. " "

Gratuities.—The new code substitutes for the former system of awarding soldiers and airmen a gratuity of £1 for each year of active service, a scheme of gratuities for men discharged or transferred to the reserve, and not eligible for service pension, on completion normally of not less than ten years' service, at the following rates: after ten years' service, £50; for each year in excess of ten years' service, £25; subject to a maximum total of £200. Payment of a gratuity under the new scheme is conditional on the acceptance of a reserve liability, if so required.

Special Provisions for Airman Aircrew.—There are special considerations affecting airman aircrew which necessitate separate provisions for the P. and gratuities of this category. Direct entrant pilots and navigators who are discharged on completion of a five-year engagement will receive a gratuity of £200. Pilots and navigators who are re-engaged, on completion of their initial five-year engagement, to complete twenty-two years' service, will be eligible for pension on the normal scale and under the normal

conditions set out above. They will in addition qualify for a special addition to the service element of pension at the rate of 8d. a week for each year of service while employed on aircrew duties. Thus, a pilot or navigator who completes twenty-two years' service will qualify for a special addition of 14s. 8d. a week provided he has been employed throughout on aircrew duties. No similar provision is made for signallers, engineers, and gunners, since these personnel will revert to their trade and will have the opportunity of re-engaging for long service.

Additions in respect of Age and Good Conduct, etc.—With the introduction of the new P. scale the existing provision for additions to pension in respect of age, and also the special provision for additions to naval pension in respect of good conduct, were abolished. Also, the new scale will fall to be adjusted, in conformity with any general decision which may be given regarding state service pensioners as a whole, when P. under the National Insurance scheme become issuable concurrently with them; but the minister of national insurance may make regulations modifying the provisions of the National Insurance Act in relation to the members of the forces.

WAR PENSIONS.—In the course of the First World War the need for a unified system of administration of P. and grants in respect of disablement or death as a result of service in the armed forces became manifest. Parliament decided, therefore, that a separate dept. should be set up for this purpose and, by the provisions of the Ministry of Pensions Act, 1916, the powers and duties of the service depts. on pension matters were transferred to the newly formed Ministry of Pensions. The war P. provisions were at once reviewed and many improvements were introduced; in particular, the basis of compensation was radically altered, the principle of degree of disablement by war service being substituted for that of loss of earning capacity or wages. This not only ensured equal valuation for equal incapacity but permitted the payment of pension in addition to earnings.

At the outbreak of the Second World War the scope of the war P. provisions was greatly enlarged to include members of the mercantile marine disabled or dying as a result of war at sea or capture by the enemy, members of civil defence organisations injured or killed on duty, and civilians disabled or dying as the result of enemy action. Later, the provisions for the armed forces were extended to members of the Home Guard. Disablement is assessed by a comparison of the disabled person's condition with that of a normal healthy person of the same age and sex and is expressed as a percentage, the maximum assessment being 100 per cent. The claimant is not required to prove that his disablement is connected with war service and he is given the benefit of any reasonable doubt. In cases where a claim to war pension is made over seven years from the end of war service the conditions are slightly more stringent.

Independent P. appeal tribunals have been estab. to hear appeals against decisions of the ministry in regard to entitlement to pension and assessment of disablement. The rate of pension for a private soldier for 100 per cent disablement is 45s. and there are rank additions, ranging in the case of members below officer status from 3s. 4d. to 16s. 8d. a week. Allowances of 10s. a week for a wife (16s. during treatment or when the pensioner is unemployable) and 7s. 6d. for each child are also provided. The allowance for children is payable in addition to any allowances granted under the Family Allowances Act. In certain circumstances children's allowances are continued beyond the normal age limit of sixteen, or eighteen in the case of an officer's child, and provision is also made for education grants up to £80 per annum for each eligible child over five years of age.

Where a pensioner is unemployable on account of his pensioned disability he may be granted a supplement to pension up to 20s. a week inclusive of any National Health Insurance benefit. Where he is partially disabled and his disablement prevents him from resuming his pre-service occupation or one of equivalent standard a special allowance is payable. In cases of severe disablement an allowance ranging from 10s. to 40s. a week is payable where regular attendance is required at home. Exceptional wear and tear of clothing, especially in amputee cases, has been recognised by the grant of an allowance up to £5 a year. Special allowances are also payable during periods of treatment and when a pensioner has to abstain from work following treatment.

Pension is granted to a widow where her husband's death is caused or hastened by war service or is the result of enemy action. There are two scales of pension; the higher basic weekly rate of 35s. which is payable to a widow of forty years of age or over, or with a child eligible for allowances, or incapable of self-support. In other cases the rate is 20s. As in the case of disablement there are additions according to the rank held by the husband. Where the widow of a member below officer status has his children living with her and is paying more than 8s. a week rent, her pension may be supplemented by an amount up to 15s. a week representing the excess rent over 8s. A widow's pension ceases on her remarriage. Children's allowances and education grants may be awarded in respect of children of deceased members on the same basis as in the case of disabled members. The allowance for a child of a member below officer status is 11s. a week and for the child of an officer £36 per annum. If the child is a total orphan the allowance is 13s. 6d. a week increased to 20s. at the age of fifteen. This allowance is further increased to 26s. at the age of eighteen if the orphan is incapable of self-support. Comparable allowances are granted in respect of an officer's child. P. to parents and other dependants of a deceased member may be awarded on the basis of need, broadly interpreted, and the amount of support

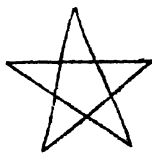
which the deceased gave, or might have been expected to give, to the parent or dependant.

Pensions, Ministry of. Before the First World War each service dept. administered its own pension questions but owing to the vast numbers involved in the First World War the existing machinery proved to be totally inadequate. Public feeling over this inadequacy was voiced in the House of Commons with the result that the M. of P. was created towards the end of 1916. This dept. deals with P. due to service in the First World War, Royal Irish Constabulary (now disbanded) P., and merchant seamen's war P. The head of the M. of P. is a minister who is not a member of the Cabinet. ('Service pensions' of the forces are administered by the service depts. See under PENSIONS.)

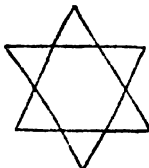
Pensions, Non-Contributory. Retirement, and Widows', see under NATIONAL INSURANCE ACT (1946).

Pensnett, iron and coal mining vil. of Staffordshire, England, 2 m. S.W. of Dudley. Pop. of eccles. dist. 7000.

Pentacle, Pentangle, Pentagram, Pentagonon (obsolete), or **Pentalpha**, figure of five straight lines forming a five-pointed star. Found frequently in early ornamental art, it was used as a mystic symbol by the Pythagoreans, and later by astrologers and necromancers in the Middle



PENTACLE



HEXAGRAM

Agree. Together with the sign of the cross, it came to be used on doorways and thresholds as a charm to keep away witches and evil spirits. It should be formed without a break in the drawing. The hexagram (two interlaced equilateral triangles), also used as a mystic symbol, is often confused with it.

Pentacrinus, stalked sea lilies (Crinoides, q.v.). **Ps.** were particularly numerous in the early part of the Liassic period, and are represented by still living species. The joints of the stem are pentagonal in outline. In some cases a pentacrinoid is a larval stage, e.g. that of *Aneides rosacea*. **Ps.** occur in the floor of the ocean at moderate depths.

Pentadesma butyracea, see BUTTER-TREE.

Pentagon. The world's largest office building, on the Virginia side of the Potomac R., Washington, U.S.A. It was built (1941-43) to accommodate the increase in Amer. War Dept. personnel, and cost about \$64,000,000. The building brought all three services beneath the same roof, and approximately 32,000 workers were employed there. It is five storeys high, simple in style, and built

round a 5-ac. court, the perimeter of the building being nearly 1 m. There are 17 m. of corridors and it possesses the largest private branch telephone exchange in the world. It is equipped with many cafeterias, a medical service, and a large library.

Pentamerone, II, or Lo Cunto de li Cunti overo lo trattenimento de li Peccerille, book of peasant fairy stories in Neapolitan dialect, collected and transcribed by Giambattista Basile, and pub. posthumously in 1637. This collection, the first of its kind, is divided into five days each containing ten tales, hence the name. The P. is of priceless interest to folklorists, retaining as it does all the freshness of the originals as heard from the lips of the people. The best ed. is that by B. Croce, *G. Basile ed il Cunto de li Cunti*, 1891. There is an Eng. trans. by Sir R. Burton, 1893.

Pentane (C_5H_{12}), hydrocarbon of the methane series, existing in three isomeric modifications. Two of these, viz. P. (boiling point $38^\circ C.$) and isopentane (boiling point $30^\circ C.$), occur in petroleum, and are colourless mobile liquids. The third, tetramethylmethane (boiling point $9.5^\circ C.$), is obtained by treating tertiary butyl iodide with zinc methyl. These isomers are volatile, inflammable liquids, which are, chemically, very stable. P. is one of the components of the petroleum ether, gasoline, petrol, etc., used as solvents for resins, oils, and caoutchouc, and for internal combustion motors. P. is also used in the P. lamp as a standard in photometry.

Pentateuch, see HEXATEUCH.

Pentecost, see WHIT SUNDAY.

Pentland Firth, channel separating the Orkney Is. and Caithness, N. Scotland. It is 14 m. long and from 6 to 8 m. wide. There is a ferry, but strong tidal currents and whirlpools render navigation dangerous. The Pentland Skerries, 5 m. N.E. of Duncansby Head, include two islets, one of which has a lighthouse, and some rocks.

Pentland Hills, ridge in the Lowlands of Scotland, extending N.E. from the border of Lanarkshire, through Peeblesshire, to the centre of the co. of Midlothian, and to within 4 m. of the city of Edinburgh. The mean height is upwards of 1000 ft.; the breadth 4 to 6 m. Scald Law (1895 ft.) and Carnethy (1850 ft.) are the highest peaks.

Pentstemon, genus of perennial plants (family Scrophulariaceae), natives of N. America, bearing blue, purple, lilac, scarlet, rose, or yellow flowers, and of great value in the garden as border or rockery plants. They are raised from seed sown under cover in spring or from cuttings inserted in early autumn and kept through the winter in a cold frame. Hybrids between *P. Cobaea* and *P. Hartwegii* are the most popular garden sorts.

Penza: 1. Region of the R.S.F.S.R. The surface is undulating, intersected by deep ravines, and rising in the S. and S.W. to the watershed between the Don and the Volga (860 ft.). The soil is fertile, watered by the Moksha and Sura, and

yields rye, oats, wheat, hemp, and flax. The chief manufs. are spirits, paper, flour, cloth, rope, leather, and matches. Area 15,000 sq. m. Pop. 2,320,000. 2. Tn. of Russia, cap. of the above region, at the confluence of the P. and the Sura, 492 m. S.E. of Moscow. The chief manufs. are paper, textiles, lumber, matches, leather, soap, wax, and camel's-hair cloths. Pop. 157,000.

Penzance, seaport and watering place of Cornwall, England, and centre of an important market-gardening and agric. area, situated at the head of Mount's Bay, 8 m. E.N.E. of Land's End, 20 m. W.S.W. of Truro, and 325 m. from the London terminus of Brit. Railways. There are a good harbour and docks and the place has a very mild climate. It is the nearest port (and only port of departure) to the Isles of Scilly, which are some 40 m. distant to the S.W. P., with Newlyn, now incorporated in the bor., is a fishing centre, especially for pilchards, and it exports tin, copper, and china clay. Woollen yarns and cloths are manufactured. It has a market in the centre of the tn., and near it the four chief streets intersect each other at right angles. Its churches are: St. Mary's, built in 1832 (the chantry of St. Mary's was founded in 1284) of cut granite in the Perpendicular style, with lofty pinnacled tower; St. Paul's (1843) of cut and rubble granite, in thirteenth-century style; and St. John's (1881), of stone, Early Eng. style; and the Rom. Catholic church built in 1847. The present site of St. Mary's church is said to have been occupied by a castle built by the Tyres, owners of the manor of Alverton. The public buildings, built of granite in lt. post-Renaissance style, erected in 1867, include the tn. hall and council chambers, St. John's Hall, and the museum of the Royal Geological Society of Cornwall. The public library is in Morrab Road, and the natural hist. museum and art gallery in Penlee Mansion House in the Penlee Memorial Park, Morrab Road. The market-house, with central dome, was built in 1837 and opened in 1838; in front of it is a marble statue of Sir Humphry Davy (1778-1829), the celebrated chemist, who was b. here. The name P. means 'holy head,' being derived from a chapel dedicated to St. Anthony, which formerly stood on a headland which now forms the base of the old pier. In 1265 Madron par., including P., was appropriated by the Knights Hospitallers. In 1332 Edward III. granted P. a weekly market and a fair of seven days at the festival of St. Peter. In 1512 P. received from Henry VIII. a charter granting it ship dues on condition of the tn. maintaining the quays in repair. The royal grant of its market was received in 1592 from Queen Elizabeth. In 1595 P. was burned and pillaged by the Spaniards and in 1646 and 1648 it was sacked by Fairfax. It was incorporated by James I. (1614). Three m. away is the world-famed St. Michael's Mount, in Mount's Bay, home of the St. Aubyn family and often compared with Mt. St. Michel in France. It is recorded that in the year 1014 Mount's

Bay was inundated by a 'mickie sea-flood,' many tns. and people being lost. The bor. was extended in 1934 and the present pop. is 20,300.

Peonage, system of agric. labour prevalent in New Mexico and other parts of Sp. America; abolished in the former state in 1867. The name is derived from Middle Lat. *pedo*, and hence from *pes*, foot. Originally a foot soldier, a *peon* came to mean a day labourer. The Indians, who hired themselves out to Sp. masters, or were bound to work for them because they were debtors or so-called criminal offenders, were called *peons*, but were really slaves.

Peony, see **PEONY**.

Peoples' Banks, see **under CO-OPERATION**.

Peoples' Democracies, phrase denoting the Communist regimes set up after the Second World War in Poland, Hungary, Bulgaria, and other E. European countries. In these states the phrase is used, along with 'Peoples' Republics,' as an official designation. A concept of democracy different from that held in W. Europe is of course implied; the word 'peoples' is intended to describe the broad base of popular support on which these regimes are all-godly based.

Peoples' High Schools (Denmark), see **FOLK HIGH SCHOOLS**.

Peoples' Palace, educational institution in the Mile End Road, London, founded through a bequest of J. E. B. Beaumont (1774-1840) for the recreation and moral and intellectual advancement of the working classes in the E. End of London. The buildings were opened in 1887. They include the Queen's Hall, which was burnt down in 1931, a technical school, now known as the E. London College, attached to London Univ., and other equipment for education and recreation.

'**People**,' Eng. Sunday newspaper, estab. in 1881, now owned by Odhams Press Ltd. It supports Socialism, but politics are not an important feature. It pioneered free insurance for its readers. The sale exceeds 4,671,000.

Pépin, or **Pippin**, name of sev. Carolingian rulers, the more important of whom are:

Pépin the Elder (d. 639), also known as *Pépin of Landen*, who was mayor of the palace to Dagobert I. of Austrasia. He was canonised and Feb. 21 was dedicated to him.

Pépin le Gros, or **Pépin d'Héristal** (d. 714), grandson of St. Arnulf, bishop of Metz and governor of Austrasia; when Dagobert d. (679) P. ruled Austrasia, subject to Thierry III., king of Neustria. During Thierry's reign he revolted, and by the victory of Testry (687) P. became master of the greater part of W. France and was recognised as *major domus* (mayor of the king's palace), which gave him power to rule the state. As mayor he ruled under Thierry, Clovis III., Childbert III., and Louis the Pious. On the death of P. his son, Charles Martel, succeeded to the mayoralty.

Pépin the Short (714-68), king of the Franks, was the younger son of Charles Martel and the father of Charlemagne.

From 741 to 747 P. and his elder brother, Carloman, ruled conjointly under the puppet king, Childeric III.; but in 747 Carloman entered a monastery, in 751 Childeric was compelled to abdicate, and P., with the aid of the pope, was crowned first Carolingian king of the Franks. In 754 he aided the pope against Aistulf, king of the Lombards; he forced Aistulf to give up Ravenna to the pope, and by this act, which is known as the 'donation of Pöpin,' laid the foundation of the temporal power of the papacy. He himself was made a 'patrician of Rome.' The rest of his life was spent in wars against the heathen Saxons, whom he tried to convert at the sword's point, against the duke of Aquitaine, against Bavaria, and against the Saracens, from whom he recovered Narbonne.

Pépin (778-810), son of Charlemagne, was crowned king of Italy by Pope Adrian in 781. He fought against the Avars, Slavs, and Saxons, drove the Saracens out of Corsica, and conquered Venice.

Pépin I. (d. 838), son of Louis the Pious, was crowned king of Aquitaine at the age of fourteen. With his brothers he twice revolted against his father, and deposed him, but finally replaced him on his throne.

Pépin II. (d. 870), son of the above, whom he succeeded as king of Aquitaine. He allied himself with Lothaire and took part in the battle of Fontenoy (841). He was deposed in favour of Charles the Bald by the treaty of Verdun, and until his imprisonment at Senlis (864) waged perpetual war against Charles.

See G. Monod, *Études sur les sources de l'histoire carolingienne*, 1894; D. Urkunden, *Die Karolinger*, 1906; and L. Lovell, *Charles et diplômes de l'histoire de France*, 1926; and *Cambridge Medieval History*, vol. II.

Peploe, Samuel John (1871-1935), Scottish painter, b. at Edinburgh, educated at Edinburgh Collegiate School and Univ. At the age of twenty he took up art, and studied in Paris and Edinburgh. His early pictures included still-lives experimenting with tones and sparing use of colour, and portraits whose dark backgrounds derived from Hals and Rembrandt. From 1905 his still-lives and Scottish landscapes acquired a luscious creamy quality; this, however, ended abruptly in 1910. In that year he married and went to France for three years. He was greatly influenced by Cézanne and the Post-Impressionists, and his paintings of Cassis and Antibes began his third style, experimenting in bright colour planes, which he brought to his many later paintings of Iona. He was associate of the Royal Scottish Academy 1917, and full member 1927.

Pepper, John Henry (1821-1900), Eng. chemist, b. at Westminster, associated with the optical illusion known as 'Pepper's Ghost,' (highly illuminated objects placed before plate glass so as to appear as if among less brilliantly lighted objects behind the glass), originally invented by Henry Dircks in connection with a piece by Dickens. P. was educated as a chemist,

and studied analytical work in various laboratories. He wrote on scientific subjects in a popular fashion. Among his works are *The Boys' Playbook of Science* (1878), and *The True History of Pepper's Ghost* (1890).

Pepper, one of the most important spices; it is derived from a creeping vine (*Piper nigrum*) which is a native of the moist low-country forests of Ceylon and S. India and has also been introduced into Malaya, Siam, the Netherlands E. Indies, and Borneo. Both 'black' and 'white' pepper are obtained from the same plant. P. contains an alkaloid (piperine), a volatile oil, an acrid resin, together with starch, gum, and albumin. The ash in ground black P. should not exceed 5 per cent, in white P. 3 per cent. Rice, linseed meal, bone dust, and other adulterants may be readily detected by the microscope. See also CAYENNE PEPPER.

Peppercorn Rent, nominal rent, in theory involving the ann. payment from lessee to lessor of one peppercorn; it was used in connection with long leases as a device for giving a leasehold the practical effect of a freehold.

Peppermint (*Mentha piperita*), small, slender, glabrous mint of the family Labiate, with stalked serrate leaves and short spikes of flowers, the calyx of which is often red. The flowers are gathered in Aug., and after drying are distilled to yield the oil of P., which enters into the composition of P. water, the spirit of P., and P. cordial. Its medicinal value is as a stimulant and as a carminative.

Pepperwort, see PIPERACEÆ.

Pepsin, enzyme elaborated in the body by the gastric tubules. It has the property of causing chemical changes by which the proteins of the food material are converted into peptones. The P. itself does not participate in the formation of the final products, and it cannot act except in conjunction with hydrochloric acid, which is also secreted by certain gastric glands. P. is also produced commercially by drying the mucous lining of the stomach of a pig or calf. If such an extract is added to food kept at the body temp., the proteins of the food are peptonized, and the resulting compound constitutes a food easily assimilated by persons of weak digestion.

Pepys, Samuel (1633-1703), Eng. administrator and diarist, was the son of John P., who became a tailor in London. References in his diary show that S. P. was educated at St. Paul's School in London and at Magdalene College, Cambridge. In 1659, through the influence of his father's cousin, Sir Edward Montagu (later earl of Sandwich), he entered the public service as a clerk of the exchequer, becoming clerk of the council in the same year, and began his *Diary*. In July 1660 he became a clerk of the Privy Seal and clerk of the 'Acts of the Navy.' He joined in the social life of the time, and managed to make a fortune out of the perquisites of his office; at the same time he made himself a thorough master of his business, and

was a zealous reformer of abuses. In 1673 he became secretary for the affairs of the navy, and in the same year became M.P. for Castle Rising, exchanging his constituency for that of Harwich in 1679. A popular but erroneous estimate of P. as an official is that of 'a painstaking departmental official.' But in truth, P. carried out, at the Admiralty, in the teeth of opposition, drastic and far-reaching reforms. In 1679 the Admiralty Commission was dissolved and replaced by men wholly incompetent for their work. P. and Sir Anthony Deane, his close friend and former commissioner of the navy, having become involved in the unpopularity of the duke of York, were accused

of selling information to France led to his retirement. His library was left to Magdalene College, Cambridge, where his *Diary* remained until 1819, when the Rev. J. Smith began to decipher it, and it was pub. by Lord Braybrooke in 1825. This *Diary* remains one of the most vivid and minute authorities for the events of the Restoration period, of the manners and scandals of the court, and of P.'s own interests and weaknesses. An ann. P. commemorative service is held at St. Olave's, Hart Street, where he was buried. He pub. *Memoirs of the Navy* (1690).

The original MS. of the *Diary* is preserved in Magdalene College, Cambridge, to which P. bequeathed it, together with other papers; it is in six vols., containing upwards of 3000 pages, closely written in Rich's system of shorthand, which P. doubtless adopted lest his jour. should fall into unfriendly hands during his life or be rashly pub. after his death. These facts are stated in the preface to the original and partial ed. of the *Diary* produced by Lord Braybrooke. Other eds. followed in 1828, 1848-49 (enlarged), 1854; a fuller ed. was pub. in 1875-79 by Dr. Mynors Bright, and in 1893-99 came H. B. Wheatley's practically complete ed. See H. B. Wheatley, *Samuel Pepys and the World he Lived in*, 1880, 1905; Sir F. Bridge, *Samuel Pepys, Lover of Music*, 1903; P. Lubbock, *Samuel Pepys*, 1909; and life by E. H. Moorhouse, *Administrator, Observer, Gossip*, 1909. Later works of reference are J. R. Tanner, *Samuel Pepys and the Royal Navy*, 1920, *Mr. Pepys: an Introduction to the Diary, together with a sketch of his later life*, 1925, and (ed.) two vols. of the correspondence of Pepys, 1926-29; and A. Ponsonby, *Samuel Pepys*, 1928. See also lives by J. Drinkwater, 1930, and A. Bryant, 1933-35.

Perak, most northerly of the Federated Malay States, on the W. coast of the Malay Peninsula. Area, 7980 sq. m. From Kalantan (q.v.) and from Pahang (q.v.) on the E. it is separated by the main range of granite mts. that forms the backbone of the peninsula. The R. P. (170 m. long), the chief riv., flows between two parallel ranges (7000 ft.) which traverse the state from N. to S. The chief exports are tin and rubber. Taiping is the cap. Iron ore, wolfram, kaolin are among the minerals besides tin. In 1938 there were over 563 000 ac. under rubber and the yield of rubber in the years immediately preceding the Second World War ranged between 45,000 and 60,000 tons. Other crops are tea, the oil-palm (a better quality of oil than is produced even in Nigeria) (average 18,000), and rice (over 90,000 ac.), grown exclusively by Asiatics on small holdings. There are aerodromes at Ipoh (opened for all types of aircraft in 1938), Taiping, and Sitiawan. P. is ruled by a dynasty that claims descent from the last Malay sultan of Malacca (q.v.). The thirty-second sultan was installed in 1939. From 1650 onwards, the Dutch tried to obtain a monopoly of the tin exported from P., establishing near the mouth of the P. R. sev. factories,



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of being Papists and were arrested and imprisoned in the Tower. They were acquitted, but after their release they had the mortification of being impotent spectators while the navy, in Anthony Deane's phrase, 'went to ruin.' And to P. a ruined navy meant a ruined England. Things went from bad to worse. From the 76 ships and 12,000 men of 1679 the navy dwindled to 24 ships and 3000 men by 1684, with empty yards, depleted stores, and sailors on the point of mutiny on being defrauded of their pay. P. urged, first on Charles II. and then on James, the project of a special commission for the recovery of the navy. James acceded, and P. overcame one difficulty after another, compelled Sir Anthony Deane from his retirement to assist, and in less than three years the effective strength was increased by ninety-two ships and the spirit and discipline of the men were restored. It is worthy of record that an Admiralty minute of 1805 spoke of P. as 'a man of extraordinary knowledge, of great talent, and the most indefatigable industry.' In 1689 a new charge

which the Malays destroyed. In 1765 the sultan made a treaty with the Dutch. Brit. influence began in the nineteenth century. A treaty with Penang (q.v.) in 1818 secured to Brit. subjects the right to free trade in P. In 1826 the sultan ceded to the Brit. the Dindings and the Is. of Pangkor as posts for the suppression of piracy, and agreed to rely solely on the protection of Great Britain. Anarchy prevailed for a time owing to fighting between rival Chinese factions over the tin deposits and, in 1874, Sir Andrew Clarke, governor of the Straits Settlements, induced the P. chiefs to sign the Pangkor Treaty, and to accept a Brit. resident whose advice should be taken on all questions other than those concerning religion or Malay religion and custom. By an Act of 1934 the ter. of the Dindings was restored to P. and has formed part of the state since Feb. 1935. In Dec. 1841 the state was overrun by the Jap. invaders and held till the surrender of 1945. With traditional Malay ceremonial Rajah Yusoff Abdul Jalil was installed (April 18, 1949) as thirty-second sultan of P. (See MALAY STATES.) Pop. (including the Dindings) 992,000, Malays, Chinese, Tamils, and Europeans (under 1000).

Perambulation, see BEATING THE BOUNDS.

Perambulator, see PEDOMETER.

Perameles, see BANDICOOT.

Percentiles, see under MENTAL TESTS.

Perceval, Sir, hero in one of the legends of the Arthurian cycle. According to the oldest version, a Fr. poem of the thirteenth century, which is only known in its Eng. adaptation, P. was the son of a widowed mother brought up in obscurity, but fired with a love of knightly deeds by an accidental meeting with Arthur's knights. This legend probably first became confused with the legend of the Holy Grail in the romance of *Perceval le Gallois*, begun by Chrétien de Troyes, continued by Wauchier de Denain and Gerbert, and finished by Manessier (see GRAIL). It is this version which is used in by far the finest setting of the legend, Wolfram von Eschenbach's *Parzival*, c. 1216, on which Wagner based the libretto of the last of his operas. For the Welsh theory see Sir J. Rhys, *Studies in the Arthurian Legend*, 1891; for the P. legend, as distinct from the Grail, see *Syr Percyelle of Galles* (ed. J. Halliwell), 1884; 'Peredur, Son of Ewrawc, in the *Mabinogion* of Lady C. Guest, 1879; W. W. Newell, *Legend of the Holy Grail*, 1902; J. L. Weston, *Legend of Sir Perceval*, 1908; J. D. Bruce, *Evolution of Arthurian Romance to 1300*, 1923-1924; W. Gother, *Perceval und der Grail in der Dichtung des Mittelalters*, 1925; and E. G. Gardner, *The Arthurian Legend in Italian Literature*, 1930.

Perceval, Spencer (1762-1812), Eng. statesman, educated at Harrow and Trinity College, Cambridge; he practised at the Bar until 1796, when he entered Parliament. He held office under Addington, and was chancellor of the Exchequer under Portland (1807). He became Prime Minister in 1809, and was assassinated on May 11, 1812, in the lobby

of the House of Commons by John Bellingham, a merchant, who attributed his bankruptcy to the gov. measures. See life by Sir Spencer Walpole, 1874.

Perch (*Perca fluviatilis*), common Brit. type of a large family of spiny-finned fishes. It prefers still waters, and only in them is it able to spawn. But it sometimes descends estuaries, and then is confused with the sea-P. or bass, a much larger fish, with eight to ten, instead of fourteen to fifteen, spines in the front dorsal fin. The greatest weight of *P. fluviatilis* on reliable record is 4½ lb.; 3 lb. is a rare weight. It is a bright-looking fish, and very conspicuous from above by the vertical, dark bars extending from the back down the sides. It is rough to the touch. The flesh, though firm and white and free from a muddy flavour, is not appreciated in Britain as it is in Russia and elsewhere.

Perch (measure), see ROD, POLE, OR PERCH.

Perch, Climbing, or *Anabas scandens*, fish which is allied to the mullet, and is noted for its ability to travel overland by means of its spines. It was believed to climb trees by the same organs, and has been found up a tree in India, but it was probably left there by a receding flood.

Percheron Breed, see HORSE.

Perchloric Acid (HClO₄) is prepared by distilling strong sulphuric acid with potassium chlorate under reduced pressure. It is a colourless, volatile, strongly turning liquid (sp. gr. 1.782 at 15° C.), and is a powerful oxidising agent, a drop of the liquid instantly decomposing if dropped upon wood or charcoal, sometimes explosively. The salts of this acid are the perchlorates, all of which are soluble in water. Potassium perchlorate is prepared by heating the chlorate, 4KClO₃ = KCl + 3KClO₄. The salt is purified from the chloride by crystallisation, the solubility of the perchlorate being about 0.7 part in 100 parts of water at 0° C.

Percival, John (1831-1918), Eng. headmaster and bishop. Son of a Westmorland farmer, he had a strenuous boyhood. In his twenty-first year he won an open scholarship to Queen's College, Oxford, of which later he was a fellow. P. accepted a post as master at Itingly (1860) and in 1862, on the recommendation of Frederick Temple (q.v.), he was appointed first headmaster of Clifton College, which was then a struggling foundation. P., who shared Arnold's views, soon raised the college to be one of the great public schools. When looking for a master for the modern side of the school, he chose the poet and divine, Thomas Edward Brown (q.v.). His success was due in no small measure to his large-heartedness and public-spirited character, and his ascendancy over the parents was as great as that over the boys. He was also prime mover in the foundation of Somerville College. In 1879 he left Clifton to become president of Trinity College, Oxford, but though he was too impatient for reforms he left a strong impress on the college. He was also a pioneer of the Univ. Extension

movement. In 1886 he accepted the head-mastership of Rugby. Nine years later he was offered by Lord Rosebery, and accepted, the bishopric of Hereford. A strong Liberal, his opinions on eccles. and political questions were not necessarily shared by the diocesan clergy and P. was almost too earnest an advocate of all that appealed to him. See life by W. Temple, 1921.

Percussion (massage). see TAPOTEMENT.

Percussion Caps, small copper cylinders which hold a detonating powder, e.g. a mixture of fulminate of mercury with potassium chlorate. These can then be exploded by percussion, and so are used in firearms. See FULMINATES; FIREARMS.

Percussion, Centre of, see CENTRE.

Percussion Instruments. All instruments played by being beaten are called P. I., including all varieties of drums, bells, cymbals, triangles, gongs, etc., also some in which the percussion is produced by the intermediary of a keyboard, such as the celesta. These last instruments, as also bells, xylophone, and kettledrums, produce notes of definite pitch; others produce sound without pitch and thus, strictly speaking, merely a kind of refined and organised noise.

Percy, noble Anglo-Norman family. Its head, Wm. de P., accompanied the Conqueror to England. The wealth and importance of the Ps. was early enhanced by marriage with the heiress of Brabant, whose arms they subsequently used. One of the family assisted in obtaining Magna Carta, and the ninth lord (the first to be summoned to Parliament) signed the barons' letter to the pope (1301). His great-grandson became marshal of England under Richard II., and was made earl of Northumberland (1377). He distinguished himself against the Scots, and took Berwick. Some years later, the Scots, by corrupting the governor, again made themselves masters of it, on which the duke of Lancaster brought an accusation against the earl in Parliament, and he was sentenced to lose his life and estates. But the king having revoked the sentence, the earl laid siege to Berwick and took it. When Holingbroke assumed the crown, with the title Henry IV., he created the earl constable of England. In the fourth year of that reign, the earl and his son, Sir Henry P., nicknamed Hotspur, defeated the Scots at Halidon Hill, and took the earl of Douglas prisoner. Having demanded his dues as keeper of the Marches, and not receiving a satisfactory answer, the earl took up arms against the king, and put Hotspur at the head of his troops; but he was slain at the battle of Shrewsbury in 1403; upon which P. made his submission and received the royal pardon. Later, however, he collected another army, but was defeated and slain in Yorkshire in 1408. Henry V. restored the title to a son of Hotspur. The second earl was slain at the battle of St. Albans in 1455; and the third at Towton, in 1460. The fourth earl was murdered while trying to collect a subsidy on behalf of Henry VII., the fifth and sixth earls d. in 1521 and

1537 respectively. The seventh was beheaded in 1572, the eighth found shot in the Tower, 1586. The ninth earl spent fifteen years imprisoned in the Tower. The tenth earl fought first against Charles I. and then helped in the Restoration. The P. family is now represented only in the female line, the male line having died out with the eleventh earl, who left an only daughter who married the duke of Somerset, the title duke of Northumberland (created in 1786), then passing through their son Algernon to his son-in-law, Sir Hugh Smithson, who became duke in 1786. His son Hugh took the name of P.; from him the present tenth duke is descended. See G. Brenan, *History of the House of Percy* (ed. W. A. Lindsay, 1902).

Percy, Esme (b. 1887), Eng. actor and theatrical producer, b. in London, studied at the Brussels Conservatoire and first appeared with F. R. Benson's company at Nottingham in 1904. His debut in London was in *Romeo and Juliet* in 1905 and in New York in *The Red Planet* in 1932. He has played prominent roles in a large number of productions and is particularly remembered for his interpretation of the leading parts of many of Shaw's plays, having acted and produced over a number of years for Charles Macdonald's Bernard Shaw Repertory Company in London and the provs.

Percy, Thomas (1728-1811), Eng. scholar, antiquary, and poetical collector, B. at Bridgnorth and educated at Christ Church, Oxford, he became bishop of Dro-more, Ireland, in 1782. The friend of



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Johnson and Goldsmith, he pub. trans. from the Icelandic, a new version of the Song of Solomon (1764), *The Household Book of the Earl of Northumberland* in 1518 (1765), and a trans. of Mallet's *Northern Antiquities* (1770). His most popular and famous work was the *Reliques of Ancient Poetry* (1765), which was composed of old

heroic ballads and songs, together with a few modern imitations by the editor. This work, which was warmly and justly praised by the critics, was chiefly obtained from an old folio MS., together with additions from the Pepys collection at Cambridge, the Ashmole Library at Oxford, the Brit. Museum, and works of early poets. The collection was of great value to our literature, recalling the public taste to the rude energy, picturesqueness, and passion of the old chivalrous minstrels and Elizabethan songsters. The work inspired Sir Walter Scott's *Minstrelsy of the Scottish Border*. See A. C. C. Gausson, *Percy, Prelate and Poet*, 1908, and T. Shearer and A. Tillotson, *Percy's Relations with Cadell and Davies*, 1934.

Percy Anecdotes, originally pub. in forty monthly parts, commencing in 1820, were compiled by 'Sholto and Reuben Percy, brothers of the Benedictine Monastery of Mount Bengier.' This was really a *nom-de-plume*. 'Reuben Percy' was Thomas Byerley, the first editor of the *Mirror*, and 'Sholto Percy,' Joseph Clinton Robertson, the founder and first editor of the *Mechanics' Magazine*. The name originated from the fact that the two authors used to meet and talk over the book at the Percy coffee house, in Rathbone Place. The idea is supposed to have come from Sir Richard Phillips, who suggested that anecdotes should be collected from the files of the *Star*, of which Byerley was assistant editor.

Perdiccas, four Macedonians:

Perdiccas I. was a native of Argos in the eighth century B.C. With two of his brothers he conquered a large part of Macedonia and founded the Macedonian dynasty.

Perdiccas II. reigned in Macedonia from about 454 to 413 B.C. During the Peloponnesian war he allied himself first with the Athenians and then with the Spartans, betraying both parties.

Perdiccas III. reigned in Macedonia from 364 to 359 B.C. Aided by the Athenian Iphicrates, he overthrew the regent Ptolemy. Later he made war against the Athenians, and fell in battle against the Illyrians.

Perdiccas IV., one of the most famous Macedonian generals under Alexander the Great, whom he accompanied into Asia. He became chief minister of Alexander's successor, Arrhidaeus, but his rivals, Antipater, Antigonos, Craterus, and Ptolemy, conspired against him. While marching against Ptolemy he was murdered at Memphis by his own soldiers (321 B.C.).

Pereda, José María de (1833-1906), Sp. novelist, b. at Polanco, near Santander, became a civil engineer. His novels, written in excellent and virile style, are pictures of the follies and humours of his contemporaries, more particularly descriptions of persons and places of his native Santander. His novels include *Escenas Montañesas* (2 series, 1861, 1871); *El Sabor de la Tierruca* (1882); *La Puchera* (1889); and *Fenas arriba* (1895). His *Don Gonzalo Gonzalez de la Gonsalera* (1879) is a politico-social satire. See

J. M. de Cossio, *La obra literaria de Pereda*, 1934, and a life by J. Camp, 1937.

Peregrine Falcon, see *FALCON*.

Pereira, tn. of Colombia, cap. of the dept. of Caldas, 40 mi. by rail from Manizales. It is a centre of the coffee and livestock industries. Pop. 65,000.

Perekop (anc. Gk. Taphros), tn in Kherson Region of the Ukrainian S.S.R., at the N. end of the isthmus of the same name, which joins the Crimea to the mainland. Some traces of Gk. fortifications still remain; the fortress was built in 1518. Pop. 7000. There was heavy fighting here during the Ger. invasion of Russia in Oct. 1911. See under *EASTERN FRONT OR RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR*.

Père-Lachaise, or Cemetery of the East, Montilmont, Paris, opened in 1804, has numerous gravestones of persons of note and is situated on an ant. property of Père la Chaise, confessor of Louis XIV. Here is the tomb of Abélard and Héloïse, whose ashes were re-interred in 1817.

Perennials are plants with roots that are able to live for a number of years by storing up a supply of reserve food. Usually the part above ground dies down. Trees and shrubs store their reserves in the parenchyma of the cortex and medullary rays in the stems.

Pérez de Ayala, Ramón, see *AYALA*.

Pérez de Guzman, Fernán (1378-c. 1460), Sp. poet and chronicler, nephew of Ayala (q.v.). Among his works are *Cronica del rey Juan II.* (pub. 1779); *Generaciones y semblanzas* (pub. in 1779), an account of the illustrious men of his time, in terse and brilliant style; *Loores de los claros varones de España*, a rhymed chronicle. His poetical works consist mainly of hymns and moral pieces: *Coplas de bien vivir*, *Coplas de vicios y virtudes*, *Confesión rimada*. A large number of them will be found in the *Cancionero general* of Baena.

Pérez de Montalván, Juan (1602-38), Sp. dramatist, b. at Madrid, entered the priestly congregation of St. Peter there. Under the influence of his friend, Lope de Vega, he wrote *Orfeo* (1624). His prose *Vida y purgatorio de San Patricio* (1627) was the foundation of Calderón's play. The best known of his plays is *Los Amantes de Teruel* (1638).

Pérez Galdós, Benito, see *GALDÓS*.

Perfectionibility of Christians, doctrine held by the Wesleyan Methodists (see *METHODISTS*) of a Christian perfection attainable in this life. It is not a perfection of justification, but a perfection of sanctification, which John Wesley, in a sermon on 'Christian Perfection' from the text Heb. vi. 1, 'Let us go on to perfection,' earnestly contends for as attainable in this life by believers. Theosophists and Buddhists generally believe that absolute perfection can (under certain very stringent conditions) be attained to in the course of the one life.

Perfectionists, sect founded at Putney, Utah, in 1842 by John Humphrey Noyes (1811-88), a former Congregational minister. He maintained that Christ had already come again and that he was

absolved of all past and future sin. After some litigation at Putney, he removed with his followers to Oneida, New York, where they purchased a property and carried out their experiment in communistic living. Financially they prospered, but were unpopular with their neighbours on account of their rejection of monogamy, and purely scientific attitude to marriage as a means of producing improved offspring. For this reason Noyes with a few close followers moved again into Canada in 1880, and the others, abandoning their experiment in communistic living, formed an ordinary joint-stock company. See G. W. Noyes, *Religious Experiences of John Humphrey Noyes*, 1923.

Performance Tests, see MENTAL TESTS.

Performing Right Society, association of composers, authors, and publishers of copyright musical works, estab. in 1914 to collect fees for the public performance of such works, and to restrain unauthorised performances thereof. The constitution is that of a company limited by guarantee.

It makes no profits for itself, pays no dividends, and charges its members no agency commission, no entrance fees, and no subscriptions. All fees collected, and all receipts from other sources, are distributed among the composers, authors, and publishers concerned, in proportion to the relative popularity of their works. No expenses are deducted from the fees beyond the cost of administration, which is less than 10 per cent of the gross sum collected. By virtue of affiliations with twenty-four similar societies in other countries the society is able to grant to those concerned with public performances of copyright music in the Brit. Isles and overseas Brit. ters. comprehensive licences which cover a repertoire comprising not only the works of its own members, but also those of members of the affiliated societies, numbering more than 75,000 composers, authors, and music publishers of all nationalities. The same affiliations ensure the protection of P. R. S. members abroad. The society's policy and administration are controlled by a board of directors elected by the members from among their own number. The board (unpaid) consists of twelve representative Brit. composers and authors and an equal number of music publishers. The operations of the society extend only to musical works. It is not concerned with the performance of non-musical plays or sketches, nor with operas, musical plays, or other dramatico-musical works when performed in their entirety by living persons on the stage.

Perfumery. Perfumes are the essences, obtained from plants chiefly, to which the flowers, leaves, etc., owe their fragrant odours; the art of P. deals with the extraction and properties of those essences and their preparation in convenient form for toilet purposes or industrial use. Gum resins have been in use from very ancient times; they are widely used as fixatives in perfume compounds to give a uniform smell throughout to the finished blend, and so stop any volatiles escaping into the

atmosphere. The true perfumes are essential or volatile oils (fr. *oto*), contained in minute sacs in the leaf, as in mint; in wood, as in sandalwood; in bark, as in cinnamon; in seeds, as in nutmeg; in rind of fruit, as in lemon; in petals of flowers, as in rose and lavender; or, as in the case of orris, in the rhizome. The extraction of the oil is performed in several ways. The process known as enfleurage consists of exposing the flowers in contact with purified lard or with fine olive oil in suitable frames, whereby the fatty substances take up and become impregnated with the essential oil. Like the process of maceration enfleurage depends for its efficacy upon the remarkable property which fats and oils possess of absorbing odours. In other cases the aroma is caught in pure olive oil contained in felt placed above the flowers. Jasmine and tuberose are best prepared by enfleurage. In the process of maceration, warm oil or melted fat is prepared, and the blossoms infused for several hours. Rose, orange, and acacia are best prepared by maceration, the jonquil and violet by the combined processes. The oils and fats produced are treated with pure absolute alcohol, which absorbs the essential oils and is decanted. In other cases the flowers are placed in water in a still, when the oils are carried off with the steam and collect on the surface of the water, from which they are siphoned off. This is the method employed with woods, barks, seeds, etc. Oil may in some cases, where it is present in large quantities, as in lemon and orange peel, be pressed out. The amount of perfume obtained varies with the species of flower and also with the season. More than one odour may be obtained from the same plant; in the case of the orange, the fruit yields Portugal oil, the flower a distinct odour, neroli, and the leaves, *petit grain*. The essential oils are all soluble in alcohol (usually acetone free), and this solution, care being taken that the alcohol is itself odourless, forms the usual 'scent.' Sometimes the oils and alcohol are distilled together. The best perfumes, however, are produced by steeping the pomades and oils from the enfleurage process for several weeks at a gentle warmth. In the case of ambergris, castor, civet, musk (qq.v.), etc., the oils are formed into a tincture by solution in alcohol. Several terms are in common use. *Extraits* are strong solutions of the oils in alcohol after the process of infusion. They may be simple or blended. *Essents* are weaker solutions. *Essences* may be the volatile oils themselves, or strong solutions of them. The terms *bouquet* and *nosegay* are applied to blended perfumes which have no one distinctive flower odour. Of animal perfumes there are only four in use: musk, civet, ambergris, and castor (qq.v.). All are extremely powerful; musk, for example, will impart odour to polished steel, though it will itself lose all fragrance within a year. Civet is even more potent than musk, and both are insupportable when strong. Castor (qq.v.) is reddish-brown, and is used in the dilute state. Ambergris from the

whale has a musky odour. They are all used in very dilute states, or merely to provide a base for bouquets.

Artificial Perfumes and Flavours.—Synthetic chem. has been successful in the preparation of artificial substances with practically the same perfumes and other characteristics as the natural products; in other cases products with similar perfumes but in many respects different. Terpineol, one of the commonest aromatic synthetics used in P., is the basis for lilac, lily, and many other compounds, the proportion being as much as 60 to 80 per cent in lilac. It is made synthetically by the action of diluted acids on oil of turpentine with continued stirring for many hours to yield terpin hydrate and afterwards terpineol. Oil of cassia is mainly cinnamic aldehyde, $C_9H_7CH=CH\cdot CO\cdot CH_3$, which may be prepared from benzaldehyde or by heating the formate and cinnamate of calcium together. Vanilla, from the pod of the vanilla bean, can now be synthesised in the laboratory. From phenol, through salicylic aldehyde, is prepared the essence of the tonka bean; anisic aldehyde is a substitute for the perfume obtained from hawthorn. From the esters and ethers other substitutes are prepared; from toluene and xylene through their isoamyl and isobutyl derivatives trinitro-isobutyl toluene with a musky odour is produced and used in soap manuf. Chlorostrylene is a substitute for hyacinth oil; from naphthalene the methyl ether or naphthol, $C_{10}H_7(OCH_3)$, or nerolin, is produced as a substitute for neroli oil; other substitutes for this are methyl anthranilate from benzoic acid and the ethyl ether of naphthol, bromella; nobile oil is substituted by the synthetic methyl benzoate; jasmine oil by styrolyl acetate from benzene. Other synthetic perfumes of great importance are the aldehydes ranging from C.6 to C.20. A few examples are: C.6, hexyl aldehyde (fruity note); C.10, decyl aldehyde (intense sweet odour); C.12, methylnonylaldehyde (when diluted smells of oranges and amber); C.14, peach aldehyde (gives a lasting odour of ripe peaches); C.16, strawberry aldehyde (powerful smell of strawberries); C.20, raspberry aldehyde (raspberry odour and used as such in flavouring). These possess, in concentrated form, a very powerful odour and should be used in 1-10 per cent solution. Sometimes as little as 1-10,000 can alter the original note of a perfume blend.

As perfumes such substitutes are quite satisfactory, but as flavours they are rather to be deprecated, since they replace, though probably the main active constituent, none of the secondary organic constituents and micro-organisms present. Beyond the general use as scents, perfumes are in use in various powders and dentifrices, in the manuf. of tobacco, as well as for flavours in some cases. In recent years much attention has been paid to methods of synthesising some of the more complex natural perfumes such as musk and violet perfumes. Mention may be made of Ruzieda's work on musk

and irone (1926-47). See G. Plesse, *Art of Perfumery*, 1862; also trans. of K. Khristov, *Rose Industry of Bulgaria*, 1890; G. W. Askinson, *Perfumes and their Preparation*, 1892; E. J. Parry, *Chemistry of Essential Oils and Artificial Perfumes*, 1899; T. Koller, *Cosmetics*, 1903; W. A. Poucher, *Perfumes and Cosmetics*, 1923; E. Sagarin, *The Science and Art of Perfumery*, 1946, *Natural Perfume Materials*, 1947; and *The Perfumery Journal* (passim).

Perga, anct. city, the ruins of which are situated in the prov. of Konla, Asiatic Turkey, 12 m. N.E. of Adalia. An important city of Pamphylia. It was famous for the worship of Artemis; was visited by St. Paul.

Pergamino, tn. of Argentina, in the dept. of Buenos Aires, 141 m. from the city of Buenos Aires and 75 m. from Rosario. It is an important railway centre and sev branches of the Bartolome Mitre Railway radiate from the tn. Pop. 30,000.

Pergamum, or **Pergamus**. The former is by far the most usual form in the classical writers, though the latter is more common in Eng., probably on account of its use in our version of the Bible, Rev. ii. 13. The word is significant, connected with *πίργος*, a tower. (1) The citadel of Troy, and used poetically for Troy itself; the poets also use the forms *Perama* and *Pergamia*. (2) Celebrated city of Asia Minor, the cap. of the kingdom of Pergamus, and afterwards of the Rom prov. of Asia. The kingdom reached its greatest extent after the defeat of Antiochus the Great by the Romans, in 190 B.C., when the Romans bestowed upon Eumenes II. the whole of Mysia, Lydia, both Phrygia, Lycania, Pisidia, and Pamphylia. It was under the same king that the celebrated library was founded at Pergama, which for a long time rivalled that of Alexandria, and the formation of which occasioned the invention of parchment, *charta Pergamena*. On the death of Attalus III. in 133 B.C., the kingdom, by a bequest in his will, passed to the Romans. Among the celebrated natives of the city were the rhetorician Apollodorus and the physician Galen. The altar of Zeus and the statue of the dying Gaul were fine examples of stonework. The modern name is *Bergama*.

Peri, Jacopo (1561-c. 1633). It. composer, b. in Florence and flourished in the time of the Medici and was an intimate of the coterie of artists and writers who sought to revive the Gk. drama. In music this group of progressives discarded counterpoint and cultivated the harmonic aspect of music. P., with Caccini, experimented in musical declamation to a suitable accompaniment and thus became the earliest composers of recitative. They may also be claimed to have been the world's first operatic composers. P.'s opera *Daphne* (1597) is lost but his *Euridice* (1600) is extant.

Peri, in Persian folk-lore a class of supernatural beings of beneficent character; in anct. Persian folk-lore, on the contrary, a female demon of malignant character. The Persian *Pa* are of both sexes, although the female is more popularly

used in legend, of surpassing beauty and immortal. They were created after the Dece, with whom they are in perpetual warfare. Moore's *Lalla Rookh* tells how a P obtained admission to paradise.

Periander, statesman of Corinth, son of Cypselus, whom he succeeded as tyrant 635 B.C., and reigned forty years, to 585 B.C. His rule was mild and beneficent at first, but afterwards became oppressive. He was commonly reckoned among the Seven Sages. He was responsible for the foundation of Macedonian colonies, and was a patron of literature and art. See also CORINTH.

Perianth, strictly the envelope or non-essential parts of a flower, even when these parts are clearly separable into calyx and corolla, but commonly used where calyx and corolla so closely resemble one another as not to be distinguishable, as for instance in the tulip and other Liliaceae. The function of the P. is to protect the stamens and pistil from wind and rain until after pollination. Usually it is brightly coloured to indicate to insects the presence of nectar. It is absent from a number of wind-pollinated plants, e.g. grasses.

Pericarditis, see PERICARDIUM.

Pericardium, see under HEART.

Perioarp, see FURT.

Pericles (490-429 B.C.) Athenian statesman, b. in Athens. He was the son of Xanthippus and Agariste and was connected with the noblest families in Athens. The most advanced teachers of his time assisted in his early training, and the philosopher Anaxagoras became his closest friend. His first recorded public act was to help in the prosecution of Cimon after the Euboean campaign. The beginning of his political ascendancy was marked by a wide expansion of Athenian power. With the aid of Ephialtes he reformed the Areopagus. After the death of Ephialtes he assumed the leadership of the state. In 444 he defeated the Sicilians and made a descent upon Euboea. In 448 he led an army to Delphi, in 445 he crushed the Euboean revolt and induced the Spartans to retreat. From 445 his foreign policy underwent great changes, losing much of its aggressiveness. His attitude towards the Pelican League was that of making subjects out of allies. His home policy was to make the Athenian people self-governing. He introduced payment for the performing of public duties, such as serving on juries etc. Through his measures the archonship became opened to the third class of citizens, also money was provided to enable the poorest people to attend theatrical displays. Towards the close of his life fresh foreign troubles arose, and Athens and Sparta commenced hostilities in 431. His adversaries chose this period of stress to attack his greatest friends, being afraid of P. himself, they prosecuted Phidias, the sculptor, and threatened Anaxagoras, and made insulting charges against Aspasia, with whom P. lived after being divorced from his wife. At the end of the first year of the war he used his great gift of oratory in his famous funeral speech.

He appealed to the pride of his countrymen, the appearance of the plague combined with the trouble abroad demoralised the people, and they no longer listened to him. He died shortly afterwards. He was frequently compared to Zeus, partly because of his dignified bearing and his thundering eloquence. He was a man of the highest honour and courage, and under the leadership of P. Athens reached her zenith of commercial and imperial prosperity. See also GREECE, History; PELOPONNESIAN WAR. See Thucydides I and II, W. W. Lloyd, *The Age of*



PERICLES

Pericles, 1875. E. Abbott, *Pericles and the Golden Age of Athens*. 1901. Study by C. Mackenzie, 1937 and A. R. Burn, *Pericles and Athens*, 1919.

Peridotites are coarsely crystalline, ultra basic igneous rocks occurring generally as intrusive masses. They contain little or no feldspar, but consist chiefly of olivine (peridotite), with augite, eustatite, diopside and magnetite. In composition they approximate to some meteorites. Special varieties have received distinctive names such as pierite, dunite, serpentinite. Although holocrystalline when fresh the rocks are generally altered, the altered rock being known as serpentinite.

Perigee, position of the moon's orbit in which she is nearest the earth. See APOTHEON; APOGEE.

Périgord, former prov. of France, in the N. of Guyenne. It was united to the Crown by Henri IV. in 1589. It now forms part of the depts of Dordogne and Lot et Garonne.

Périgueux, cap. of the dept. of Dordogne, France. It is 79 m. N.E. of Bordeaux and is situated on the r. b. of the R. Isle.

An important building is the cathedral of St. Front, of Romano-Byzantine architecture. The tn. is noted for its truffles and canned foods. Pop. 40,800.

Perihelion, point in the orbit of a comet or planet (including the earth) at which it is nearest to the sun. See **APHELION**.

Perim, ls. in the strait of Bab-el-Mandeb, 14 m. from the coast of Arabia, and 90 m. W. of Aden, its administration being connected with that of Aden. It became a Brit. possession in 1857. Said to have received its name from Pori Pasha, a Turkish ruler, its alternative name is Barim. See also under **ADEN**.

Perineum, external floor of the pelvis (q.v.). It is a tough sheet of ligaments and muscles, through which pass the genital tracts, urethra, and rectum.

Perinthus, or **Perinthus**, see **ERFELI**.

Perinthus, see under **HERACLEIA**.

Period and **Periodicity**. The word **P.** is often used in a limited sense to denote a definite length of time, e.g. a **P.** of hrst. In its wider sense it denotes a continuous cycle of events which continually repeat themselves in a definite order. Thus take three events A, B, and C, A always occurring before B, and B before C, and then A, B, C again. The time, say, which elapses between the performance of A and its next performance is called the **period** of the events, which are termed **periodic**. Thus the succession of days may be termed periodic, the beating of the heart and breathing may also be termed periodic. The revolution of the astronomical bodies is treated as periodic. These illustrations are not *strictly* periodic owing to influences which vary in their action, but for all practical purposes they may be considered so. In electricity the term is applied to the repetition of an alternating voltage; in mechanics to the phases of a vibration or oscillation. The abstract science of mathematics supplies us with strictly periodic events. Thus in trigonometry the sine function goes through a series of values as the angle increases from 0° to 360° , and is then repeated in the same order from 360° to $(360 + 2)^\circ$, and again to $(360 + 3)^\circ$, the period in this case being 360° . This idea of periodicity, or the state of being periodic, is of paramount importance in the study of mathematics, simplifying the subject in a remarkable degree. The idea underlies all the theories of wave motion in sound, light, and electricity.

Periodicals, see **MAGAZINES**; **NEWS-PAPERS**.

Periodic Functions, see **FUNCTION**.

Periodic Law. Newlands (1861) in formulating his 'law of octaves,' pointed out that if the chemical elements are arranged in order of their atomic weights, every eighth element shows strong resemblances to it. Lothar Meyer stated that 'the properties of the chemical elements are periodic functions of their atomic weights,' being led to this conclusion by a study of atomic volumes and chemical properties of elements. Mendeleeff boldly enunciated the **P. L.** to cover the observed data. The so-called law has been extremely useful in the correction of

inaccurate atomic weights (e.g. glucinum, beryllium) and as a stimulus towards the discovery of new elements (see **GALLIUM**). Exceptions to the law were suspected (e.g. tellurium and iodine); the position of hydrogen was uncertain, etc. Recent work has shown that the law should be: 'The properties of the chemical elements are periodic functions of their atomic numbers' (q.v.). (See **CHEMISTRY**, **ELEMENT**.)

Periodic System (elements), see under **CHEMISTRY**.

Perioch Tau, see **PETER THE GREAT MOUNTAINS**.

Periostitis, inflammation of the periosteum or fibrous membrane investing the greater part of the surface of the bones. It may be due to injury or infection. In acute cases swelling and suppuration occur with considerable constitutional disturbance; the blood may rapidly be charged with septic organisms, and efforts should be made to keep the condition purely local. Chronic **P.** may be due to infection from syphilis, tuberculosis, actinomycosis, or may be arthritic in origin. There is increased blood pressure in the neighbourhood, and considerable swelling and pain, which is worse in the night time. The treatment includes rest and fomentations for the relief of pain. Potassium iodide is the best medicine. Osteitis and osteomyelitis are more severe conditions, affecting respectively the bone substance and the bone marrow.

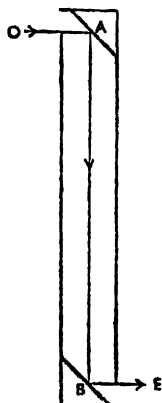
Peripatetics (Gk. *περιπατητικοί*, walking about), name given to an ancient philosophical sect; so designated, it is said, from the circumstance of its founder, Aristotle, being accustomed to deliver his doctrines while walking in the grove of the Lyceum in the suburbs of Athens. Aristotle had a series of successors who taught his doctrines with some modification. The Peripatetic philosophy was introduced into Rome probably by Carneades, and from that time, or at least from the time of Sulla the dictator, it continued to be studied by a few learned men of leisure.

Peripatus, genus of worm-like, many-legged creatures, whose structural features suggest an intermediate character between worms and the higher Arthropods. They are found in Australia, Tasmania, New Zealand, S. America, and Africa, but are absent from Madagascar. They bear a number of short fat legs, and on the head are a pair of antennae and two simple eyes. From papillae at the sides of the mouth slime is emitted in jets to catch the prey and also for defensive purposes. See **ONYCHOPHORA**.

Peripheral Paralysis, see under **PARALYSIS**.

Periscope, instrument that came into prominence during the First World War, when it was necessary for submarine and trench observers to see without being seen. The diagram shows a toy **P.** consisting of two plane mirrors, A and B, each mounted at 45° to the axis of the tube in which they are fixed. An aperture enables light from an object to travel along OA to the mirror, where it is reflected to strike the

mirror B. The light is reflected from this lower mirror to an observer E, who looks through an aperture in the tube. The mirrors A and B are generally replaced by totally reflecting prisms that perform the same function of reflecting the light as shown in the simple diagram. In addition, there is incorporated a telescopic system of lenses between the prisms that increases the field of view and produces



PRINCIPLE OF THE PERISCOPE

cially small Ps. used on the midget submarines which crippled the *Tirpitz* in the Second World War. Submarine Ps. may have means of estimating the course, speed, and distance of ships and may act as torpedo directing telescopes. As they have necessarily a large number of optical parts, the use of anti-reflection films ('blooming') has effected a considerable increase in light transmission. See P. in *Dictionary of Applied Physics*.

Perissodactyla, one of the sub-orders of the Ungulata or hoofed quadrupeds, characterised by the possession of an odd number of toes on the hind foot, and by the presence of a third trochanter in the femur or thigh bone. There are three living families of P.: (1) Equidae or Horses; (2) Tapiridae or Tapirs; and (3) Rhinocerotidae or Rhinoceroses. In addition there are a number of extinct forms. When horns occur in this sub-order they are always in the middle of the skull. See H. F. Osborn, *The Extinct Rhinoceroses*, 1898, and 'Monograph of the Titanotheres,' U.S. Geological Survey, 1928.

Peristalsis, rhythmical muscular contractions which occur in successive circles in certain organs under the control of the involuntary nervous system and propel the contents along, e.g. in the alimentary canal during digestion and in the womb during childbirth.

Peristyle (Lat. *peristylum*, Gk. *περιστύλιον*, from *περι*, about, and *στυλος*, a pillar or

column), in architecture, an open court within a house, with a colonnade around it, by which the prin. apartments were reached. A building having a single P. or row of pillars surrounding it, such as a Gk. temple, was called a peripter or periptere (Gk. *περιπτερον* (*περι*+*πτερον*, a wing).

Peritoneum, serous membrane, the largest in the body, forming a double-walled sac completely closed in the male. The visceral layer clothes all the viscera of the abdomen and pelvic cavities, and the parietal layer lines the inner walls of the abdomen, the space between the layers being filled with a film of fluid. The various organs or parts are enclosed in folds or ligaments of the P.; the *mesenteries* connect the vertebral column with the intestines; the greater or lesser *omenta* are also folds of P. Blood and lymph vessels are carried in the connective tissue of the membrane, which has a layer of pavement-shaped epithelial cells, between which are numerous openings through which the fluid, indistinguishable from lymph, escapes when in excess into the lymphatics. The great omentum contains some adipose tissue, which, when present in excess, causes abdominal corpulency; the omentum also acts as the 'abdominal policeman' by localising infection. The serous fluid may also accumulate to a large extent, e.g. in dropsy.

Peritonitis, inflammation of the peritoneum. It occurs in the acute and chronic form, and may be local or general. The onset is sometimes difficult to distinguish from colic. Commencing with a local pain, it spreads all over the abdomen and becomes intense; the breathing is shallow and rapid, the pulse rapid, the temp. raised, and vomiting is an early symptom. The knees are often drawn up, and the face pinched, drawn, and anxious; cold sweats, thirst, and diarrhoea are other symptoms. The abdomen becomes tense and swollen, due to fluid. P. may be fatal in a few days or even hours. The inflammation may arise from cold; it more commonly extends from inflammation of the organs, and is often caused by local wounds or perforations of the abdominal organs (e.g. of the stomach in gastric ulcer, or of the intestine in typhoid fever). Rupture of tumours and abscesses, an aneurysm, or any such cause of septic poisoning gives rise to general P. Bright's disease, erysipelas, appendicitis, and child-bearing may be followed by P. Surgical operation in bad cases is generally necessary. Local chronic P. is susceptible to treatment with penicillin and the sulpha group.

Perityphilitis (Gk. *περι*, around, *typhlon*, the caecum), inflammation of the peritoneum (q.v.) or serous membrane, of the caecum, or blind portion of the large intestine. The term formerly included all those cases of intestinal inflammation now known as appendicitis (q.v.).

Periwig, see under Wig.

Periwinkle, or Winkle (*Littorina*), genus of peccinibrachiate gasteropods found on most shores, where they feed on marine

vegetation. Some occur at low-water mark, and others on rocks where the sea rarely reaches them. The common *P. (L. littorea)* is a popular article of diet, and some 2000 tons of it are consumed annually in London alone. This species hatches its young from jelly-like eggs laid on seaweed, but *L. rudis*, another Brit. species, retains its young until they have reached a considerable stage of development. The shell of *P.* is thick, spiral, few-whorled, and top-shaped, with a circular mouth or aperture.

Periwinkle (*Pincta*), genus of hardy perennial plants and stove evergreen shrubs (family Apocynaceae). The large *P. (V. major)* and the lesser *P. (V. minor)* are handsome blue-flowered plants of considerable value for adorning shady positions in gardens where few flowering plants will grow. A number of handsome varieties with variegated leaves and purple or white flowers have been introduced.

Periyar, River, chief riv. of Travancore, India. It rises on the W. face of the Ghat range and is navigable for 60 m. For the *P. R.* irrigation scheme see *under* MADRAS.

Perjury, crime of wilfully making a false statement on oath as a witness (or interpreter) in a law court, such statement being *material* to the question in issue and made deliberately or without belief in its truth. It is for the judge to decide whether the statement was *material*, and for the jury to say whether the intention of the accused was to deceive. There can be no conviction for *P.* as a general rule upon the evidence of one witness alone as to the falsity of the accused's statement; there must be either two witnesses to contradict the accused, or one to contradict together with some other evidence materially corroborating the contradiction. The whole law of *P.* was consolidated in the Perjury Act of 1911. The punishment is penal servitude up to seven years or imprisonment for two years with or without hard labour, or (and) a fine. The term *false swearing* applies to false oaths *not* taken in the course of judicial proceedings, e.g. false declarations with reference to marriages, births, or deaths, in bankruptcy matters, by a voter, etc. Such false oaths are punishable as *P.*

Perkin Warbeck, see WARRECK, PERKIN. **Perkin, Sir William Henry** (1838-1907), chemist, b. in London and educated at the City of London School and the Royal College of Chemistry. He turned his knowledge of chem. to commercial uses. He is best known for his researches in the direction of dyes and coal-tar colourings and sev. processes were invented by him. He may be said to have founded the coal-tar colour industry.

Perlis, one of the Unfederated (see MALAY) Malay States under Brit. protection; lies on the N.W. coast of the Malay Peninsula. Area about 310 sq. m. with a coast-line of 13 m. *P.* is bordered on the W. by a range of mts. running N. and S., which separate it from the Siamese prov. of Setul; on the E. it is bordered by

another Siamese prov. and by the Malay state of Kedah; and on the S. by Kedah. Padang Besar on the main trunk line to Bangkok is the frontier railway station between Siam and Malaya. Striking features of the landscape are the isolated limestone hills which rise steeply from the plain. The *P. R.* is the only one of any size, and is navigable by small craft as far as Kangsar, the cap. The rajah resides at Arau. Rice and tin are the chief products and exports. Until 1821 *P.* was subject to Kedah, but when in 1841 Siam allowed the sultan of Kedah to reassemble the government, *P.* was made an independent state under an Arab rajah. In 1905, at the request of the rajah, a European adviser was appointed to advise him in the finances and general management of the state. By a subsequent treaty, between Britain and Siam, his duties were transferred to a Brit. adviser of the Malayan civil service. By a treaty of 1930 between Britain and *P.* the latter agreed to continue under the protection of Great Britain as suzerain and to accept a Brit. adviser. Pop. 57,800 (Malays 46,100; Chinese 8400; Indians 1200).

Perlite Structure, structure found in volcanic glasses, such as obsidian. By the contraction (on cooling) of the homogeneous mass, a system of reticulated and spiral cracks has been set up, giving the rock a finely globular character.

Perm. see MOLOTOV.

Permalloy, see *under* NICKEL.

Permanent Court of International Justice, see INTERNATIONAL JUSTICE, PERMANENT COURT OF.

Permanent Debt, see *under* PUBLIC DEBT.

Permanganic Acid (HMnO_4) is obtained in the form of purple crystals by evaporating its aqueous solution under reduced pressure. The aqueous solution itself is made by the addition of dilute sulphuric acid to barium permanganate and filtering off the precipitated barium sulphate: $\text{Ba}(\text{MnO}_4)_2 + \text{H}_2\text{SO}_4 = 2\text{HMnO}_4 + \text{BaSO}_4$. *P. A.* is an unstable compound readily decomposing to form manganese dioxide, water and oxygen: $4\text{HMnO}_4 = 4\text{MnO}_2 + 2\text{H}_2\text{O} + 3\text{O}_2$. It is very reactive and has powerful oxidising properties.

Permian, name given to the lower div. of the New Red Sandstone, which is derived from Perm in Russia, where the strata are well developed. The Brit. *P.* strata consist of red sandstones, concretionary, limestones, shales, marls, volcanic and limestone breccias, and beds of gypsum and rock-salt. These strata are in general found connected with the areas of Carboniferous rocks, either fringing the coal-fields conformably or resting unconformably on the millstone grit or mt. limestone. On the E. side of the Pennines the *P.* rocks occupy a narrow stretch of country from the Tyne through Durham and York to the Trent. The *P.* on the W. side of the Pennines occurs in the Vale of Eden. In the midlands a coarse volcanic breccia rests upon a lower series of concretionary sandstones, and is overlain by sandstones and marls. This breccia has been assigned

by some to glacial action, and by others is believed to be due to torrential deposition. In Devonshire and Scotland the rocks are made up of breccias and sandstones, while those of N. Ireland are mainly marls and fossiliferous magnesian limestones. The fossils of the P. are chiefly Palaeozoic in type. The invertebrates include Brachiopods, Lamellibranchs, and Gasteropods, which become stunted in the higher beds and finally disappear. The Amphibia, as in the Carboniferous period, belong to the Labyrinthodontia. Fishes such as *Palaeoniscus* also occur, and reptiles appear for the first time in these beds, e.g. *Protosaurus* and *Pariasaurus*. The flora of the P. is closely allied to the Carboniferous. *Pecopteris* and *Ondopteris* ferns of Carboniferous genera are common, as also are lepidodendroids and calamites. Cycads first appear in the P. rocks, and the strata contain characteristic plants such as *Psaronius* and *Walcchia*. The P. of India and the S. hemisphere is characterised by *Glossopteris* and other Mesozoic types. In Germany the P. receives the name 'Dyassic,' being made up of two groups, the Zechstein and Rothliegendes, the former having a bed of rock salt at Spereberg which is 4000 ft. thick. A vast area of P. is found in the Perm. dist. in Russia, and near the Uralis the beds are of marine type. In Carinthia and Sicily the entire series is marine, containing a rich and peculiar fauna which is also found in the salt ranges of the Punjab. The *Glossopteris* flora of the P. of S. India, S. Africa, and Australia is often so abundant as to afford seams of coal. The existence of boulder beds in these rocks is evidence of glaciation in P. time. In N. America a fresh-water series is found in the Alleghenies and Appalachians and a marine development in Texas. The P. period was one of great earth movement, which brought about the isolation of the coal-fields. Continental conditions prevailed over the S. hemisphere, and inland seas were formed over W. Europe from which beds of gypsum and rock salt were derived. See R. L. Sherlock, *The Permian-Triassic Formations*, 1918.

Permutations and Combinations. A combination in mathematics is a selection without reference to order of a given number of elements from a given group. Thus of the group *abc* the combinations taken two at a time are *ab, ac, bc*; of the group *abcd* the combinations taken three at a time are *abc, acd, bcd, abd*. In general the number of combinations of *n* different things taken *r* at a time, written nC_r , is $n(n-1)(n-2) \dots (n-r+1)/1, 2, 3 \dots r$, which may be written $n!/(n-r)!$ where *n!* means the continued product of all numbers from unity up to *n* inclusive. Permutation considers not merely selection but arrangement, so that the permutations of *abc* taken two at a time are *ab, ba, ac, ca, bc, cb*. The number of permutations of *n* things taken at a time, i.e. nP_r , is $n!/(n-r)!$. Example: A telephone exchange has 40 subscribers; in how many ways may two be put into communication? Any one can ring up 39

others, and this can be done in 40×39 ways. (Permutations.) But A may ring up B, or B A, and each pair occurs twice. If combination only is required 20×39 is the number. In this article reference can only be made to the simpler results of combinatorial analysis that are obtained in algebraical theory dealing with P. and C. Each of the arrangements which can be made by taking some or all of a number of things is called a permutation, e.g. How many different numbers can be found by using five out of the nine digits 1, 2, 3, ... 9? The problem is to find the number of permutations of 9 different things taken 5 at a time. One arrangement is 12345; another is 96231.

The first number in any arrangement may be any one of the nine. When it is chosen the next number may be any of the remaining eight, and so on, so that the total number of arrangements is $9 \times 8 \times 7 \times 6 \times 5 = 15120$. In general the number of arrangements of *n* dissimilar things taken *r* at a time is written nP_r , the symbol for $n(n-1)(n-2) \dots (n-r+1)$.

Each of the groups or selections which can be made by taking some or all of a number of things is called a combination. Referring to the previous example, while 12345 and 54321 are both different arrangements they are counted as the same combination. The number of combinations of *n* dissimilar things taken *r* at a time is written nC_r , which is the symbol for

$$\frac{n(n-1)(n-2) \dots (n-r+1)}{1, 2, 3, \dots r}$$

e.g. From a total of 15 cricketers how many ways can an eleven be chosen? The required number is ${}^{15}C_{11}$.

$$\frac{15 \times 14 \times 13 \times \dots \times 5}{1 \times 2 \times 3 \times \dots \times 11} = 1365 \text{ ways.}$$

See W. W. Ball, *Mathematical Recreations* (5th ed.), 1911; H. E. Dudeney, *Canterbury Puzzles* (2nd ed.), 1919; J. Degrazia, *Maths is Fun*, 1919; and M. Krutzhik, *Mathematical Recreations*, 1949.

Pernambuco, state of Brazil, on the Atlantic coast. The coast regions are low-lying, while the inland areas rise in a plateau. The former, known as *Mattas*, are the forest regions. The chief productions of the state are sugar, fruit, tobacco, cotton, coffee, all of which, with rum and rubber, are exported. The average yield of sugar from the P. cane is 65 tons per hectare, or $2\frac{1}{2}$ ac. Maize, manioc or cassava, and other foods are cultivated for local consumption by the labouring classes. The chief port is P., consisting of three parts, Recife (*q.v.*), this name also being used for the whole port, São Antonio, and Boa Vista. There is an airline to Rio de Janeiro. Area 49,560 sq. m. Pop. 2,993,000; (tn.), 350,000. P. wood is a variety of Brazil wood, which as a dye wood is exported in large quantities. This variety is the product of *Cesalpinia echinata*. The Sp.-Brazilian trade with the wealthy sugar prov. of P. was at its height in the first quarter of the seventeenth century, when the Sp. and

Portuguese crowns were united, and before the renewal of the Dutch war drove Sp. shipping from the S. Atlantic.

Pernov or **Pernau** (Estonian, *Pärnviigi*), tn. of the Estonian S.S.R. on the N. part of the gulf of Riga at the estuary of the P. R. It trades chiefly in linseed, wood-pulp, fish, oil, and flax. Pop. 21,500.

Pérogas, **Baron de**, see VAUGELAS, **CLAUDE FAYRE DE**.

Perón, **Juan Domingo** (b. 1895), Argentinian statesman, b. near Lobos, a tn. S. of Buenos Aires. Educated at military schools, he became a lieutenant at twenty. Between then and 1943 he was not heard of outside his own country; but on June 4 of that year he led a party of young Nationalist military officers in a successful coup d'état against President Ramón Castillo. From that time he was the power behind the president, although for a time he held no conspicuous office. In 1944, however, President Farrell appointed him to be war minister and then vice-president. This, however, did not satisfy P.'s ambition and in the following year he still further strengthened his hold over the gov., and though after an abortive attempt at another coup he was driven out for a brief period, he returned stronger than ever. In Feb. 1946 he was elected president on the Labour party platform and inaugurated in the following June. In 1947 he called on his adherents to crush his opponents as 'oligarchs and politicians and native communists,' an appeal, perhaps, more in the nature of propaganda than practical politics. With the ratification by the Argentine Congress of the United Nations Charter P. seemed to modify his intransigence, declaring that the era of 'misunderstandings' with the other W. hemisphere countries was closed. In the same year his gov. took a full part in the Inter-Allied Amer. Defence Conference at Rio. A characteristically worded attack on the opponents of his regime was made by P. at Santa Fé in Sept. 1948, with prin. reference to the opposition of the Radical party to proposals for the reform of the constitution which had been passed by the 'Peronista' majority in Aug. 1948. He identified his opponents as 'all who are rich, those who do not work, those who are professional politicians, and those who defend the interests of foreign capitalistic trusts,' adding that though for the past two years he had called for 'peace and co-operation' he would 'speak with a firm voice on the day he ordered them' (his opponents) 'to be hanged.' The Argentine Gov. announced that a plot had been discovered to assassinate P. and his wife after a performance in the Colón Opera House in Buenos Aires on Oct. 12, 1948. Later, charges were preferred against some seventeen persons including Cipriano Reyes, a former deputy and labour leader. See also ARGENTINE REPUBLIC, *History*.

Péronne, tn. in the dept. of Somme, France, 22 m. S.E.W. of Cambrai. It was the scene of the signing of a treaty forced by Charles the Bold of Burgundy on Louis XI. in 1468, and was captured in 1815 by Wellington, and in 1871 sur-

rendered to the Gers. In the First World War, the tn. soon fell to the Gers.; was recaptured by the Fr. in 1917, lost again a year later, and then finally recaptured by the Australians in Sept. 1918. During the struggle most of the buildings were destroyed. Pop. 4000.

Perosi, **Lorenzo** (b. 1872), It. priest and composer, b. at Tortona. He studied music at the conservatory of Milan, and after his study took holy orders. He became choirmaster at St. Mark's, Venice, in 1894, and afterwards director of the Sistine Chapel in Rome in 1898. In 1905 he was nominated perpetual master of the Pontifical Chapel. Most of his music is sacred, his fame resting principally on his masses and oratorios. Among his works are *La Passione di Cristo* (1897); *La Trasfigurazione del Nostro Signore Gesù Cristo* (1908); *La Risurrezione di Lazzaro* (1898); *Dies Iste* (1912), and *Giorni di Tribolazione* (1916). See studies by A. Danerini, 1921, and Z. Musmeci, *Don Lorenzo Perosi e le sue opere*, 1932.

Pérouse, **La**, **Jean François de Gálup**, Comte de (1741-88), Fr. navigator, b. near Albi. He served with distinction during the war with England (1778-83), especially on the E. coast of Canada and in Hudson Bay, where he captured Forts Prince of Wales and York (1782). In 1785 he set out from Brest to discover the N.W. passage and also to explore the N.W. coasts of America and the N.E. coasts of Asia, as well as the China and Japan seas, the Solomon Is., and Australia. He reached Mt. St. Elias in Alaska and visited the Hawaiian Is., discovered Necker Is., and then crossed over to Asia, where after exploring the coasts of Japan, Korea, and Chinese Tartary, he discovered La P. Strait between Saghalien and Yezo. In 1788 he sailed from Botany Bay, after which all trace of him was lost until 1828, when wrecks were discovered N. of the New Hebrides by Dumont d'Urville. They were brought back to France, and are in the marine museum of the Louvre. See M. Mureau, *Voyage de la Pérouse autour du monde* (4 vols.), 1797.

Pérouse Island, **La**, see under LORD HOWE ISLAND.

Perowne, **John James Stewart** (1823-1904), Eng. divine and scholar, b. at Burdwan, Bengal. Bishop of Worcester from 1891 to 1901. He was a biblical scholar and exegetist and wrote a work on the Book of Psalms. He lectured on theology at Trinity College, Cambridge, and ed. the *Cambridge Bible for Schools*. He was made canon of Llandaff in 1869, and dean of Peterborough in 1878. Other works of his were *The Labours and Strength of the Christian Ministry* (1847); *Immortality* (1869); and *The Doctrine of the Lord's Supper* (2nd ed. 1887). He also ed. the *Letters and Remains of Bishop Thirlwall* (1877).

Perpendicular, see ARCHITECTURE, *Gothic*.

Perpetual Cure, see CURATE.

Perpetual Motion has been sought by many genuine experimenters in the past, in spite of its scientific impossibility. A

P. M. machine is one that will move and continue to move for ever without receiving any supply of energy from an external source. The requirements of such a machine are either that it shall be perfectly frictionless, or if friction is present, that the machine shall create energy in order to overcome the friction. The first requirement, complete absence of friction in a real machine, is impossible, and the second violates the law of conservation of energy, which states that the total energy of an isolated system is constant; it can neither be increased nor decreased. In other words, energy can neither be created nor destroyed. The only hope of discovery of P. M. lies in the discovery of an exception to the law of conservation of energy, and although no scientific law is dogmatic, this law is based on the reliable and patient experiments of generations of scientists. Many examples of attempts to produce P. M. are given in M. du C. Andrade's book, *Engines* (1928). One attempt was made by Bishop Wilkins.

Perpetuity. Eng. law regards as null and void any tying-up of property, real or personal, beyond the period of a life or lives in being and twenty-one years (together with a further period for gestation, where, in the particular case, it actually exists) afterwards. Or, in other words, any marriage settlement, will, or other instrument providing for the future destination of property must ensure that the property shall in any conceivable event ultimately vest in possession within the above-stated period, e.g. a gift by will in trust for X for life, and after his death to such of his children as shall reach twenty-one years of age to vest in them respectively at that age, is valid; but to A for life, and after his decease to such of his children and grandchildren as shall reach twenty-one, is void as a P.; for though any children of A, must, if they reach twenty-one, necessarily do so within twenty-one years of A's death, some of the grandchildren might not. Any limitation void as a P. fails altogether, and hence, in the above example, the whole devise to the class made up of both children and grandchildren would fail. See also LIMITATION OF ESTATES; LAND LAWS.

Perpignan, cap. of the dept. of Pyrénées-Orientales, France, on the R. Têt, 35 m. S.W. of Narbonne. It has an eccles. college and sev. other educational buildings, and a museum. It possesses also a strong citadel of the counts of Roussillon, and an old cathedral founded in 1324. The chief articles of trade are Roussillon wine, silk, and cigarette papers. Pop. 72,000.

Perranzabuloe, par. of Cornwall, England, 5½ m. N.W. of Truro. In 1835 a church, which had been buried in sand for hundreds of years, was discovered. The remains of this building, now known as 'St. Piran's Oratory,' are enclosed in a concrete shell for preservation. A second church was built in the same area about 1150. This also became enveloped in sand and the present par. church, built between 2 and 3 m. inland, was erected in

1804, largely from parts removed from the second church. Perranporth, the largest vil. in the par., is now a well-known and flourishing summer resort. Pop. 3300.

Perrault, Charles (1628-1703), Fr. writer, b. in Paris. In 1651 he became a member of the Paris Bar, and obtained a considerable measure of success as a pleader, but having made the acquaintance of the minister Colbert, he was diverted from the practice of his profession by being appointed controller-general of the royal buildings. In 1671 the influence of Colbert procured for him an entrance into the Fr. Academy, into which learned body he introduced sev. important reforms. His name was first made well known by his famous controversy with Boileau regarding the comparative merits of the ancients and moderns, which originated in a poem of P.'s entitled *Le Siècle de Louis le Grand* read before his confrères of the Academy in 1687, and was intended to prove that modern authors were superior to Homer, Herodotus, Plato, Aristotle, Virgil, etc. It was followed up by *Parallèles des anciens et des modernes* (4 vols. 1683-97). P.'s attention was turned still more closely and critically to his contemporaries, the result of which was an admirable work, *Hommes illustres du siècle de Louis XIV.* (1696), containing 200 critical biographies. But the work that has far more than any other preserved his name is his *Histoires du temps passé*, or fairy tales. These were first pub in a miscellany during 1696-97, the individual titles being *La Belle au Bois Dormant*, *Petit Chaperon Rouge*, *La Barbe Bleue*, *Le Chat Botté*, *Les Fées*, *Cendrillon*, and *Riquet à la Houppe*. It is hardly necessary to observe that these are all traditional titles and that P. has no claim to the invention of the subjects; but his skill in adjusting style to matter could not easily be rivalled, much less exceeded.

See P. Saintyves, *Les Contes de Perrault*, 1923.

Perrault, Claude (1613-88), Fr. architect, b. in Paris. He was the son of Pierre P. and brother to Charles. He was by profession a physician, but abandoning this in order to study art, became the architect of the Louvre, his colonnade ranking among the finest erections of the seventeenth century. He also trans. Vitruvius's *De Architectura libri decem* (1673), and helped his brother in the writing of his *Mémoires*. See A. Hallays, *Les Perrault* (2nd ed.), 1926.

Perrin, Claude Victor, *See* VICTOR PERRIN, JEAN BAPTISTE (1870-1942). Fr. physicist, b. at Lille, noted for his studies of the structure of matter and the equilibrium of sedimentation. In 1924 he received the Nobel prize for his work on these subjects. His works include *Traité de chimie physique* (vol. 1, 1903); *Les Atomes* (1913); and *Les Éléments de la physique* (1930).

Perry, Frederick John (b. 1909), Eng. lawn tennis player, b. at Stockport. In 1929 he was the world table-tennis champion. Turning to lawn tennis he won the Wimbledon singles championship in 1934,

1935, and 1936, and became the champion of the U.S.A. in 1931. In 1937 he turned professional, and became an Amer. citizen in 1940. He wrote *My Story* (1934).

Perry, Matthew Calbraith (1794-1858), Amer. naval officer, b. at Newport, Rhode Is., U.S.A. As commander of the *Fulton*, the earliest steam warship (1837), he is sometimes called the 'father of the steam navy' of America. In 1843 he served on the W. African coast in putting down the slave trade, and in 1848-49 he served in the Mexican war, in which his squadron seized Frontera and Tabasco. But his chief title to fame is that he led an expedition in 1853 to Japan and negotiated a treaty which in effect reopened communication between that country and the rest of the world after 250 years of isolation. This treaty between Japan and America, which was signed on March 13, 1854, granted America trading rights at Hakodate and Shimoda. It was ratified at Shimoda on Feb. 21, 1855. See also *JAPAN, History*.

Perry, Oliver Hazard (1786-1819), Amer. naval captain, who held various commands during the war of 1812. He had charge of the Lake Erie squadron, and defeated Capt. Robert Barclay, who had served with Nelson, at the battle of Lake Erie. P. took an important part in the operations of Detroit, and at the battle of the Thames. He was honoured by the thanks of Congress.

Perry, William James (1887-1949), Brit. anthropologist educated at the City of London School and at Selwyn College, Cambridge. Later he came into association with Elliot Smith (later Sir Grafton Elliot Smith (q.v.)), who was then at Manchester pursuing anthropological studies initiated by his experience as an orientalist. With him, P. became a champion of the diffusionist school in anthropology, whose revolutionary doctrines so stirred the anthropological world. In 1919 he became reader in comparative religion in the Victoria Univ. of Manchester. His anthropological concepts were formulated in *The Origin of Magic and Religion* (1923), and *The Children of the Sun* (1923). In that year he was appointed reader in cultural anthropology in the Univ. of London but had to retire through ill-health in 1939. His other works are *Megalithic Culture of Indonesia* (1918), and *The Primordial Ocean* (1935).

Perry, alcoholic liquor which is manufactured from certain varieties of pears as cider is from apples. It is sweet and of a pale colour, and is sometimes mixed with champagne of an inferior quality. It contains from about 3 to 8 per cent of alcohol. It is made chiefly in England in the cos. of Gloucester, Hereford, Worcester, Somerset, and Devon.

Perryville, vil. in Boyle co., Kentucky, U.S.A., the scene of Gen. Bragg's unsuccessful campaign.

Persea gratissima, see **AVOCADO PEAR**.
Persecution, attempt to suppress obnoxious opinions, chiefly in the field of religion, by temporal punishment, carried usually as far as the death penalty. During the first days of Christianity the

Christians underwent much P. from the Jews, and the Rom. Gov. also visited them with great severity. The number of Ps. suffered under the Rom. emperors is usually somewhat artificially reckoned as ten; under Nero, A.D. 61; Domitian, 95; Trajan, 107; Hadrian, 135; Marcus Aurelius, 165; Septimius Severus, 202; Maximinus, 235; Decius, 249; Valerianus, 257; Diocletian, 303. Others omit Hadrian and insert Aurelian, 275. When Christianity became the state religion there was much P. of the Catholics by the Arians, and by the Catholics of the various heretical sects. In the Middle Ages P. was freely used as a weapon against the spread of heretical opinions, as in the case of the Cathari and Albigenses. The Protestant reformers used the same method. The case of Servetus at Geneva, and of the Quakers in New England, are classic examples. The Jews (q.v.) have suffered severe Ps. throughout Europe at different times, many being massacred in the occupied Europe during the Second World War, anti-Semitism being a distinguishing feature of National Socialism, and it is met with in almost all missionary endeavours.

Perseid Meteors, popularly designated as 'sparks from St. Lawrence's gridiron,' are a swarm of meteors moving round the sun in a retrograde and elongated orbit. This orbit is intersected by that of the earth about Aug. 10 each year, with the result that a shower of 'shooting-stars' comes from a *radiant* in the constellation Perseus. An intermittent dropping of Perseids continues for about three weeks after that date, showing that the swarm must be about 30,000,000 m. in width. It was shown in 1966 by the It. astronomer, Schiaparelli, that the orbit of the P. M. is probably identical with that of Tuttle's comet (Aug. 1862) and that the meteors are debris from the comet striking the earth's atmosphere. See **METEORS**.

Persephone, see **PROSERPINE**.

Persepolis, cap. of Persis (Persia) and of the Persian empire. It appears to have been seldom used as the royal residence. Neither Herodotus, Xenophon, Ctesias, nor the sacred writers during the Persian period mention it at all, though they often speak of Babylon, Susa, and Ecbatana as the caps. of the empire. It is only from the Grk. writers after the Macedonian conquest that we learn its rank, which appears to have consisted chiefly in its being one of the two burial places of the kings (the other being Pasargadae, q.v.), and also a royal treasury; for Alexander found in the palace immense riches. It preserved its splendour till after the Macedonian conquest, when it was burnt by Alexander, as the story goes, setting fire to the palace with his own hand at the end of a revel at the instigation of the courtesan Thais, 331 B.C. It appears frequently in subsequent hist., both ant. and mediev. It is now deserted, but its ruins are considerable. See also **PERSES**, *Antiquities*. See E. F. Schmidt, *The Treasury of Persepolis*, 1939.

Perse School, Cambridge, was founded in 1615 under the will of Stephen P.

(1548-1615). Additions were made in 1842, and a girls' school estab. in 1881. The original site was bought by the univ. in 1890, when the school was moved.

Perseus, in Gk. legend was a son of Zeus and Danaë, the daughter of Acrisius, king of Argos. Polydeutes, king of Seriphos, being in love with Danaë, sent P. on the quest for the head of Medusa the Gorgon (q.v.). The youth succeeded in his object through the help of Athena and Hermes. On his way home P. rescued Andromeda from a sea-monster and married her. He then rescued his mother from the persecutions of Polydeutes,



PERSEUS HOLDING THE HEAD OF MEDUSA
Statue by Benvenuto Cellini.

whom he turned into stone. Later he inadvertently slew his grandfather when hurling a quail, thus fulfilling a prophecy made at his birth. P. became successively king of Argos and Tiryns; the foundation of Mycenæ (q.v.) is attributed to him. There is a statue of P., holding the Gorgon's head, by Benvenuto Cellini (q.v.) in Florence. See C. Kingsley, *The Heroes*, 1875; E. S. Hatland, *The Legend of Perseus*, 1894-96; and J. M. Woodward, *Perseus: a Study in Greek Art and Legend*, 1937.

Perseus, anet. N. constellation (between Taurus and Cassiopeia) rich in astronomical interest. For a brief account of the nova which appeared on Aug. 22, 1901, in Caput Medusæ, see NOVÆ, and for the meteoric stream which radiates from a point near γ Persel, see PERSID METEORS. In the head of Medusa (in the left hand of P.) is the well-known short period variable Algol or β Persel. Its changes from

magnitude 2.3 to 3.5 are repeated regularly after a period of 2 days 20 hrs. and 49 min. α Persel is a star of the solar type, its magnitude being 1.9.

Perseverance of Saints, doctrine necessarily resulting from the most essential parts of the Calvinistic system, and held by almost all who adopt the Calvinistic or so-called Augustinian doctrines. It is advocated not only by arguments from other doctrines, as those of election, atonement, the intercession, and mediatorial dominion of Christ, imputed righteousness and regeneration; but also from many texts of Scripture, as those which declare eternal life to be always connected with believing, and those which encourage the believer to depend on the faithfulness, love, and omnipotence of God. To an objection very commonly urged against it, that it tends to make men careless concerning virtue and holiness, its advocates reply that this objection is only valid against a doctrine very different from theirs, the true doctrine of P. of S. being one of perseverance in holiness, and giving no encouragement to a confidence of final salvation which is not connected with a present and even an increasing holiness.

Pershing, John Joseph (1860-1948), Amer. soldier, b. at Laclede, Missouri; memorable in U.S. hist. as commander-in-chief of Amer. forces in France in the First World War. He was the son of a foreman platelayer on the railway. On leaving the normal school at Kirksville he worked in a general store, and after successfully competing in an examination for cadetships to the U.S. Military Academy he was posted to the 6th U.S. Cavalry. He was then assigned as military instructor at the univ. of Nebraska, and, later, as teacher of tactics at the U.S. Military Academy. Having served in Cuba and the Philippines, he was promoted brigadier-general in 1906 and major-general in 1913. When the U.S.A. broke off diplomatic relations with Germany early in 1917, P. was given command of the Amer. forces. He found himself in disagreement with the allied commanders as to the distribution of his troops. But so grave had the military situation become during the great Ger. offensive on the Somme and Lys in March-April 1918 that he was compelled for a time to place his troops unreservedly at Foch's disposition. P. conducted two major operations. In Sept. 1918, in one battle he 'flattened' the famous salient at St. Mihiel (q.v.) where the Gers. had held throughout the war. He then wished to advance on Metz, but was overruled by Foch and assigned the difficult terrain of the Meuse-Argonne where the battle raged through the autumn months until, on Nov. 7, 1918, Amer. troops were in sight of Sedan. On Sept. 1, 1919, the administration showed its appreciation of his services by making him a full general of the Amer. Army, a rank which had only been held by four men before, Washington, Grant, Sherman, and Sheridan. In 1921 he became chief of staff of the army, and retired in 1924. P.'s greatest quality was

resolution: as a strategist he had little subtlety, nor did he at first appreciate the resilience of the Ger. defensive system. His organising ability was high, and his confidence unshakable. His own story has been told in his book, *My Experiences in the World War* (1931).

Pershore, murt. tn. in the co. of Worcester, and 9 m. S.E. of the city of that name, on the Avon. It contains two churches, that of St. Andrew's, small and auct., and the church of the Holy Cross, in Norman and Early Eng., with a lofty square tower. This church is the only remaining portion of the auct. abbey-church of the same name. The inhab. are chiefly employed in manufacturing agric. implements, and in raising fruits and vegetables for the markets of the large manufacturing tns. in the vicinity. Pop. 4,000.

Persia (Iran), extensive kingdom of W. Asia, called by the natives Iran, is bounded W. by Kurdistan (Turkey) and Iraq, S.W. and S. by the Persian Gulf and the Arabian Sea, E. by Baluchistan and Afghanistan, and N. and N.W. by the Turkmen Republic (U.S.S.R.), the Caspian Sea, and Russian Transcaucasia (Armenia and Azerbaijan). The name was changed from P. to Iran on March 21, 1935, and it reverted to P. in 1942. The surface presents the appearance of a vast tableland, skirted on the N. by mt. masses known as the Kiburz range, whose peaks in many cases rise to a height of over 12,000 ft., culminating in Mt. Demavend, a dormant or extinct volcano, which has an altitude of over 18,500 ft. This range continues on the E. flank, where it is known as the Ala-Dagh, and varies from 8,000 to 10,000 ft. above sea level, with many valleys interspersed; it joins the Paropamisan (Paropamisus) range in Afghanistan. This great range sweeping from the Caucasus to Baluchistan (1,100 m.) was known to the ancients as the Zagros. Numerous parallel ranges in the N.W. trend in a S.E. direction towards Baluchistan, the highest peaks (11,000 ft.) being in the Bakhtiari dist. The S.W. portion of the country is fairly level and fertile, producing fruit in abundance, excellent wine, and mulberries; also pistachio nuts, dates, and trees which produce mutton. Although there are many rivers, of considerable size when in flood, very few of them are navigable; some dry up in the summer, and, owing to the shifting sand, blown by the terrific wind storms, sifting up their beds, they change their course in the winter, when the freshets come down from the mts. The Karun is the prin. riv.

At the N.W. extremity of the Zagros range the peaks are grouped round the great salt lake of Reza'ye (or Urmieh), the area of which varies from 1700 to 2300 sq. m. at various times of the year. This lake is the centre of a drainage area of 20,000 sq. m., one of the most fertile regions of P.; silk, cotton, rice, tobacco, melons, grapes, and fruit of many kinds are grown here, and the mineral wealth includes gold, copper, lead, iron, and oil. There are numerous other smaller salt

lakes, some of which are fringed with swamps. Owing to its comparatively high fertility the countryside of the prov. of Azerbaijan gives the impression of being more thickly covered with vegetation than other parts of P., excepting the shores of the Caspian Sea. Further S. the appearance of the land begins to change. Instead of wooded slopes there is bare and rugged mt. scenery and the prevailing colour is grey with huge outcrops of slate, forming part of a tangled mass of rock. Towards the W. the hills slope away towards the plains of Iraq. After crossing the valley of the Abe-dez R., which flows into the Karun R. and eventually therefore joins the Tigris and Euphrates, the highest point of P. is reached, the huge snow-capped Zard Kuh or Yellow Mts. of Lorestan (11,000-14,000 ft.), a region which attracts few but the hardy Lori tribesmen. Roads here are scarce and the surface structure of the landscape is fantastically broken and jagged, weathering having apparently had very little effect on the rock formations. The colour of the rocks varies from grey and whitish-grey to the reddish-orange of the *gach* or sandstone of the S. hills. Permanent vegetation is almost unknown, and in the rainless summer the rocks are hot and lifeless; but in spring, after the autumn and winter rains, the scene changes to a mass of luxuriant grass, wild scarlet poppies, and other flowers. Here the summer temp. is 120° F.; yet man and beast contrive to live on a bare subsistence level. Mt. sheep, wolves, jackals, hyenas, and even bears and leopards, are found here, besides the meagre-looking cattle and sheep of the Lori and Bakhtiari tribesmen. These tribesmen are notable for their fine physique and independent outlook born of their harsh existence. Only in recent years have they gradually abandoned raiding for settled agriculture. The triangular shaped piece of ter. cut off by the edge of the mts., the Iraq frontier, and the Persian Gulf, is a flat alluvial plain, watered by the Karun R., on which gazelle and game birds abound. This area (including the Bakhtiari Mts.) was once the heart of the Persian Empire, as may be inferred from the ruins of palaces and abandoned irrigation trenches. The inhab. mainly Arab, are here poverty-stricken and dwell in mud vills, on scanty crops. The discovery of oil in the mts. and the Abadan refinery have, however, restored a measure of importance to this part of the country, while a railway has given to Ahwaz once more the dignity of a trade centre. The E. slopes of the Zagros range are far less abrupt than the Zard Kuh and form part of a great plateau extending as far as Afghanistan. The strip nearest the mts. is very fertile and in it are Kashan, Kerman, and the holy cities of Yazd and Kumm. Some of these tns. now have modern carpet or other factories; copper, opium, and tobacco are its chief products; lead and silver are also mined. Here too is Isfahan (or Istahan), the old cap., whose gardens are famous. Yazd and Kerman are further

to the S.E. and in less fertile country. Teheran (or Tehran) lies on this plain near the junction of the two main ranges of P., the Zagros and the Elburz, which latter forms a wall along the low-lying coast of the Caspian. The S. slopes of these mts., like those of the central ranges, are rocky, bare, and rainless. But on the other side of the passes the country changes to a fertile land of high rainfall, its whole appearance not unlike the Eng. countryside, apart from some terraced rice-fields. Most of the timber of P. comes from the Elburz forests of oak, elm, ash, beech, willow, and cypress.

summers warm. On the plains and coast lands the heat is almost unbearable in summer, while biting cold winds prevail in the winter. Ispahan, which lies at an altitude of 5000 ft., is cooler than Teheran (3800 ft.), whose ann. mean temp. is about 60°, fluctuating between 110° in summer and 3° in winter. The rainfall is scanty and very irregular. At Bushire, on the Persian Gulf, about 12 in. of rain fall annually, mainly in Nov. The average rainfall may be put at 9½ in.

AREA, POPULATION, ETC.—According to the most reliable sources, the country has an area of 629,000 sq. m., and extends



PERSIA: KURASHAN WILDERNESS

E N 4.

In these forests are found many wild carnivora—including bears, wolves, leopards, and sometimes tigers. Between the two arms of the Elburz range lies the Dasht-i-Kavir, the Great Desert of P., a barren area of 150,000 sq. m. or nearly one-quarter of the total area of P., with an average elevation of 2000 ft. Date palms are grown in a few cases. Such little water as exists drains into salt swamps but dries up in summer. In the N.E. is a fertile strip of country on the edge of the desert, on which lies Meshed, the holy city of P. The S.E. extension of the desert is known as the Dasht-i-Lut or Salt Sea, with an average elevation of 1000 ft. Along the seashore of the Caspian are grown such exotic products as dates, sugar-cane, and opium. The temp. here is high in summer and malaria occurs. The only ins. here of any size are Bushire and, further inland, Shiraz.

The climate varies with the elevation. In the N. and mountainous parts the winters are exceedingly severe, but the

about 900 m. from E. to W., and 500 m. from N. to S., with a p.p. of some 15,000,000, of whom 3,000,000 are nomads. P. is divided into ten provs. (*ostan*), each under a governor-general. These are subdivided into a total of forty-nine covs. (*shahrestan*), centred on some important tn., with a governor in each; further sub-divs. are municipalities (*bakhsh*) and rural dists. (*dehestan*). Teheran, a walled city, 11 m. in circumference, is the cap., and the pop. with the dist. is 699,000. Other large cities are Tabriz (214,000), Ispahan (205,000), Meshed (176,000), Shiraz (129,000), Resht (122,000), Hamadan (104,000), Kermanshah (89,000), Ardebil (63,000), Yazd (60,000), Kazvin (60,000), Sul'zabad (55,000), Kerman (50,000), Ka' an (4,000), Abadan (40,000), Pallevi (37,000), and Ahwaz, Kurranshahr, Babul, and Kum, with pops. of about 30,000.

DEPOSITS, PRODUCE, ETC.—P. is rich in mineral deposits, which include gold, silver, lead, copper, antimony, nickel,

cobalt, zinc, manganese, borax, ochre, iron, and coal; but the scarcity of water and fuel, combined with the bad roads and the great distance from the ports, has prevented their exploitation to any considerable extent. Salt pits are numerous, and oil is being obtained from wells in the N.W. provs. The country is noted for its turquoises and other precious stones, the former being worked at Nishapur. The chief productions are wheat, barley, rice, gum, fruit, drugs, silk, cotton, and wool. Native industries are mainly of the handicraft class. Persian carpets are famous and the old methods of manu. are still maintained. Isfahan is the centre for metal work, embroidery, lacquer, and wood-carving. Shiraz is the centre for wines and Hamadan for blue-glazed earthenware. Fabrics and textiles of many kinds (including silk brocade, gold tissues, gold velvet, and silk mixed with goat's hair) are made at sev. places, and modern methods are displacing handicraft. There are cotton mills at Shahi (12,000 spindles), Yazd, Isfahan, Bandar Abbas, Kerman, Tabriz, and Teheran. There are also silk, wool, and beet and cane-sugar factories. Yet other industries include jute mills, leather goods factories, and vegetable oil refineries. The heavy industries include shipbuilding at Pahlevi (formerly Enzeli), iron foundries and blast furnaces at Mazandaran, aircraft, and munition factories. Coal-mines are worked at Zirab and Elburz, iron at Semnan, and copper at Abasabad. Chemical products are also being made in increasing quantities, notably glycerin and tar products. Oil, of course, is still the leading industry, but inasmuch as the Persian Gov. has been allowed little part in its development, they have been somewhat unwilling to give the industry its due measure of recognition. The refinery at Abadan is one of the largest in the world. Persian requirements are supplied by the refinery at Kermanshah. On the Caspian the chief port is now Bandar Shah, the terminus of the railway, where there is a jetty 1 m. long. Pahlevi is, however, still important for the trade with Russia and there are other smaller ports, Bandar Guz, Mashhadar, Noshahr, and Astara on the Persian-Russian frontier and Lingah on the Persian Gulf. P. has a small merchant fleet, but most of the shipping is in Russian hands. Imports for 1946-7 were valued at £26,139,000 and exports at £53,189,000.

COMMUNICATIONS.—Trade routes between E. and W. have since early times passed through P., but only in late years have railways been built to any extent. The Trans-Iranian Railway (total length 865 m.) from Bandar Shah, on the Caspian Sea, to Bandar Shapur, on the Persian Gulf, was officially inaugurated in 1938, the cost being £30,000,000. The line runs through Teheran and opens up the fertile prov. of Mazandaran. A branch line was carried to Meshed in May 1941; new lines are being constructed from Teheran to Tabriz, from Semnan to Meshed, and from Qum to Yazd. As a fact the original

plans were designed to link up Russian and Indian systems and the Trans-European, Iraqi, and Iranian systems, and it was a great disappointment to the great powers when Riza Shah decided to plan his railway with purely national ends in view. Yet, actually, the line follows very closely a route suggested twenty years earlier, and surveyed in part by Brit. engineers. After crossing the Karun, the line begins to climb rapidly and, after Andimeshk, twists in spectacular manner for about 100 m., reaching its highest point in a pass over 7200 ft. up; in this section alone there are 127 tunnels, one over 1½ m. long. The anc. caravan routes have been improved, and motor roads run between the chief tns. The 117 km. from Teheran to Qum was asphalted in 1947. Aerial transport was instituted in 1926, and before the Second World War was practically monopolised by the Ger. Junkers firm. Brit. Overseas Airways operates a line from London to Teheran by way of Rome and Lydda. In 1932 the concession granted to Junkers for the monopoly of the air mail and passenger services was cancelled and the Persian Gov., in 1937, organised its own regular services to Bagdad via Kermanshah and to Bushire. Iranian Airways operates a line to Paris, as does Air France via Beirut. There are numerous aerodromes, but many are in a poor state of repair. The most important are those near Teheran, at Gluzian (opposite Pahlevi), Tabriz, Meshed, Hamadan, Kermanshah, Isfahan, Bushire, and Shiraz. The Anglo-Persian Oil Company runs its own fleet of planes, with good aerodromes at Abadan and elsewhere on the oil-fields. The telegraph system covers about 11,300 m.: telephones are controlled by sev. small companies but principally by the Société Anonyme de Téléphones, Persia. There are also stations for wireless telegraphy. The Teheran broadcasting station was opened in 1910, the first of a network to be distributed over the whole country.

GOVERNMENT.—Various minor alterations have taken place in the constitution and gov. of P. since 1906, and the administration is at present carried on by a Cabinet of fourteen ministers. The Kajar dynasty, having been in existence since 1779, ended in 1926, when the Pahlevi dynasty was introduced by Riza Shah. The latter abdicated in 1941 and d. in 1944, being succeeded by his son, Mohammed Riza Pahlevi. The constitution estab. a national assembly, an elective body which numbers 136 members, which remains in office for two years and is not affected by changes of gov. The franchise is extended to all adult males, but as there are no political parties elections arouse no great interest and candidates are judged mainly on their personal merits. The assembly is really an advisory body in principle; all legislation is initiated by the gov. depts., and submitted to an appropriate committee of the assembly and finally sent to the shah for signature. In practice the deputies do little more than confirm the decisions of

the shah promulgated through ministers. The executive functions are entirely separated from the legislature. Besides the Cabinet there is also a Ministry of Court, concerned with the management of the households of the shah and the crown prince. The constitution also provides for an upper House of some thirty members appointed by the shah and thirty elected by the voters. In practice this body only meets when for some reason the assembly could not be convened.

DEFENCE.—The army's peacetime strength is about 90,000, consisting of twelve divs. of all arms, and one cavalry brigade, and its wartime strength is probably three or four times this figure. The regular army is supported by a fairly comprehensive system of conscription. The main garrisons are at Teheran and Ahwaz. Artillery forms a large part of its armament. In 1941 the army had 100 Skoda tanks and some other modern weapons. The small air force (attached to the army) numbered (1941) four squadrons totalling about 200 machines, mainly Brit.-built. There are three flying schools at Ahwaz and Meshed. Ger. influence in army training was noticeable before 1941. The gendarmerie consists of about 21,000 men, in thirteen regiments organised territorially; it is in process of reorganisation. There are U.S. military missions attached to it, and to the army. The navy consisted in 1941 of two gunboats with 1-in. guns (one was sunk on Aug. 27, 1941) and four sloops with 2-in. guns and two anti-aircraft guns. A few conscripts, mostly Arabs, are taken into the navy. The cost of the services is about £2,000,000 annually.

JURISPRUDENCE.—Persian law is founded on the Code Napoléon and the judicial system is also based on that of France. The old *Sharia* law was replaced by civil and criminal codes, based on Fr. law, in 1927-1928, but in 1939 a new penal code, based on the It. model, was introduced. The highest court is situated at Teheran, and a minister of justice superintends the administration of justice. The hierarchy of justice is built up on the summary courts; above these are the co. courts and the appeal or prov. courts. In 1928 P. formally announced the abolition of the Capitulations (q.v.).

RELIGION AND EDUCATION.—The religion of the country is Mohammedanism, of the Shi'ah sect, which is embraced by 7,500,000 of the inhab., while 850,000 belong to the Sunni sect, the remainder being Armenians, Jews, Parsees, and Nestorians. There is a small number of those who preserve the anct. Zoroastrian beliefs. The power of the Persian priesthood has disappeared in recent years, owing to the enhanced power of the central gov. The highest authority, the chief priest, is the leading *mullahid*, who resides at Najaf or Kerbela, near Bagdad. Some consider him the vice-regent of the Prophet Mohammed, the representative of the Imâm. All mosques and shrines have endowments (*waqf*), which are now administered by the Ministry of Public Instruction and devoted to charitable

institutions. The shrines of some cherished saints are so lavishly endowed as to maintain an immense staff of priests, servants, and dependants.

Education in recent years has made rapid progress; the old system of instruction, generally religious, has been entirely changed in favour of schools on European lines. Official schools are subsidised by the gov.; foreign schools are maintained by missions. In 1940 there were 8200 schools of all kinds (as compared with 512 in 1922) with nearly 500,000 pupils and 13,600 teachers. Of these 1316 were state primary and 200 secondary and higher schools, the remainder being 'private' institutions. The general trend of educational reorganisation under the gov. of Riza Shah Pahlavi was to bring all education under direct state control, and non-state schools are subjected to many restrictions and their teachers must have the qualifications required of state teachers. Foreign schools may not take primary pupils of Persian nationality. Kindergarten schools are part of the national system (ages 4-7). At the age of seven the child comes under the compulsory scheme and enters a primary school (7-13). Secondary education is not compulsory. Like primary, the course is for six years, after which entrance to the univ. is possible. Education in many branches of art and science is given at Teheran Univ. (founded on Feb. 5, 1935). Students come to this univ. from all over P., and also from Iraq, Istanbul, India, and Russia. Primary importance is attached to the faculties of medicine and industry. The Anglo-Iranian Oil Company has sent a number of Iranian students to England for technical training. Many Iranians, prominent in public life, studied at the Amer. univ. of Beirut. The Higher Teachers' College in Teheran supplies most of the secondary teachers. Women students were admitted on equal terms after the 'emancipation' of 1936. There is also a Teheran college of art, various technical colleges under appropriate ministries, and a girls' technical school, also in Teheran. In P.'s modern educational system comparatively little importance is attached to religious instruction, and a great deal to ethics particularly of citizenship and patriotism.

FINANCE.—The revenue is derived mainly from land tax, crown lands, customs duties, and from monopolies of sugar, opium, matches, tea, and tobacco. The oil royalties are kept separate from the general revenue. Gov. expenditure has risen very considerably between 1924 and 1942, and with it taxation and the cost of living. Thus in 1923-24 budget revenue was only £5,250,000 and expenditure £5,500,000; in 1941-42 the totals were respectively £39,000,000 and £38,800,000. The biggest item of expenditure in recent years is accounted for by roads and the railway. The Persian rial was tied to the Amer. dollar in 1939.

ANTIQUITIES.—P. contains the ruins of many cities which were of great importance in anct. times. Ecbatana, once a

city of great splendour, and the Median cap., was the summer residence of the Persian rulers. It is now a shapeless mound, near which is built the modern tn. of Hamadan. Persepolis (q.v.) in the plain of Mervdasht is known to the Persians as the throne of Jamshid. Here the great terraces are covered with bas-reliefs, remains of palaces, and Zoroastrian fire-temples. The house of Darius and the house of Xerxes stood here, the hall of a hundred columns, fired by Alexander, once lifted its roofs of cedar; pillars without roofs and human-headed bulls are in

at a prehistoric site near Rezaivvch in Azerbaijan revealed a stratified sequence of material, chiefly pottery, dating from the beginning of the third millennium to about 1000 B.C. A number of previously unknown types were found, as well as varieties similar to the earliest material found at Cr. in the Aegean, and in Minoan Crete.

DYNASTIES.—Pre-Islamic: The Achæmenids, 559-331 B.C.; the Seleucids, 323 B.C.-A.D. 129; the Parthians, 218 B.C.-A.D. 226; the Sassanians, A.D. 226-641. **Islamic:** The Caliphs of Damascus, 661-750; the Caliphs of Bagdad, 750-1258;



SASSANIAN GRAVE TOWER, VARAMIN

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existence, the site having been a ruin for 2000 years. In sev. places are rock-hewn tombs. Perhaps the best examples are at Naksh-e-Rustum, covered with carvings and reliefs. The remains of Pasargade, the cap. of Cyrus, are interesting. The tomb of Cyrus lies at no great distance, resembling a small Gk. temple, now in ruins. Inscriptions carved on rocks are plentiful, and Rom. remains are scattered all over the country. At Behistun, E. of Kermanshah is a ridge of rock carved with the inscription of Darius the Great; this inscription gave us the key to cuneiform writing, deciphered by Sir Henry Rawlinson. The mounds of rubbish that mark the site of Shapur, the cap. of the Sassanian dynasty, contain sev. fine rock sculptures, and on one side of the valley is a cave containing a ruined statue of Shapur, one of the few statues discovered in P. Excavations during 1918

the Samanids, 874-999; the Buwayhids, 932-1056; the Ghaznavids, 962-1186; the Seljuks, 1037-1300; the Khwarazmshahs, 1077-1220; the Mongol Il-Khans of P., 1258-1336; the Jalayirs (Iraq), 1336-1411; the Mazaffarids (Fars, Kerman), 1313-93; the Karts (Herat), 1241-1389; the Sarbadars (Khurasan), 1337-81; Tamerlane and the Timurids, 1369-1500; the Kara-Koyunlu or Black Sheep, 1378-1469; the Aq-Koyunlu or White Sheep, 1378-1502; the Safavids, 1502-1736; the Afghans, 1722-29; the Zends, 1750-94; the Kajars, 1770-1926. **Pahlavi, 1926.**

HISTORY.—The origin of the inhab. of Iran is wrapped in legend. That they were Aryans, but at what date they migrated to the plains of Iran from the E., it is difficult to state. They were closely related to the Indians, with whom they must have previously formed a single people known as Arya. It appears that

these people made a movement westward about 1700 B.C.; they introduced the horse into W. Asia, where it was previously unknown. There are records of Shalmaneser II., the Assyrian king, battling with the Medes in 836 B.C., and of Sargon gaining tribute from Median princes whose names are unmistakably Iranian. These people were divided into sev. tribes, the prin. being the Medes in the N.W., the Persians in the S., and the Parthians in Khorassan, the Bactrians on the N. line of the Hindu-Kush. The beginning of the Median monarchy probably goes back no further than 650 B.C., about which time the Medes threw off the yoke of Assyria. The first king whose name we know is Phraortes, probably the first independent king of Media. In 553 B.C. the Persian Cyrus of the Achemenid dynasty, king of Anshan in Elam, defeated the Medes, obtained their cap. Ecbatana, and took Astyages, king of the Medes, prisoner. Cyrus combined the two tribes and founded the nation of P. His disregard for the treaties made by Media with other nations caused a coalition to be formed against him. Nabonidus of Babylon, Croesus of Lydia, the Spartans, and Amasis of Egypt, co' bnd. to attack him. Croesus was defeated at Pteria in Cappadocia and driven back to Lydia. The victorious Persians continued to defeat all their enemies. Sardis fell next, then the Gk. littoral tns., the Carians and Lycians followed, and then Cyrus conquered Babylon and destroyed the Chaldean Empire. He d. in a war against the E. nomads, 528 B.C.

His son Cambyses succeeded him. He had little of the genius of his father. His cruelty was abominable, and his habits could only have been those of one half insane. His brother Smerdis was murdered secretly on suspicion of conspiring against him. This deed caused numerous insurrections that were brutally crushed by Cambyses' relative, the Gen. Darius. In 525 B.C. Cambyses conquered Egypt, but his expeditions against the Ethiopian kingdom of Napota and Meroe, and against Carthage, failed. He d. in 522 B.C., and left no heir.

Darius I. (521-485 B.C.) succeeded him. He was a member of the noble family of Achemenids. Having organised his empire on broad lines he enlarged the boundaries of P. as far eastward as the Indus. He then marched N. into Russia, but found the climate impossible for his soldiers. Darius next invaded Greece (see GREECE, *History*), but his army of some 50,000 men was defeated on the plains of Marathon.

At his death (485 B.C.) his son Xerxes succeeded to the throne. He continued the war against Greece but was defeated at Salamis (480) and finally at Plataea in the following year. A period of decadence followed. Xerxes was murdered by his vizier, Artabanus, who attempted to seize the throne (465). Artaxerxes I. succeeded him (465-425), followed by Xerxes II. (425-424), both weak and amiable potentates, with little influence. Darius II. (424-404) was a man of dif-

ferent temper, and an inhumanly cruel tyrant. His wife, Parysatis, is said to have surpassed him in bloodthirsty cruelty. Artaxerxes II. (404-359) was a ruler of weak character. He was succeeded by Artaxerxes III. (Ochus) (359-338). This king was remarkable for his ruthlessness. Every revolt was crushed with great brutality, but he succeeded in uniting the empire once more and in restoring a certain amount of greatness to Persia.

The last king of the Achemenian dynasty was Darius III. (336-331). He was defeated by Alexander the Great at Issus and assassinated, and P. became a part of the Macedonian Empire. Alexander's early death in 323 B.C. prevented complete order being restored to P., and fierce strife commenced at once among the generals for the possession of the empire. Seleucus managed to seize Babylon and its prov., and founded the Seleucid dynasty. He subdued the whole of Persia as far as the Indus. In 301, at the battle of Ipsus, he won Syria and the E. portion of Asia Minor.

A confusion of names of leaders and chiefs follows. Chief among the monarchs of Parthia was Mithridates the Great (171-138). He conquered Media and Elam, and seized the kingdom of Armenia. His son, Phraates II., added Margiana to his kingdom and defeated Antiochus VII. of Syria. Phraates III., who allied himself with Pompey, was murdered (57 B.C.), and his sons, Mithridates III. and Orodes I., fought for the succession. The former died and Orodes became king. He took the unct. Achemenian title of king of kings. (For his famous defeat of the Romans, see ROME.) His son, Phraates, murdered him and became king. This man moved his cap. to Ctesiphon, which remained the seat of government till the Muslim conquest. Mark Antony invaded Parthia in 33 B.C., anxious to avenge Crassus, slain by Orodes at Carrhae, but was forced to retreat to Armenia with the loss of 30,000 men. Rome now ceased to trouble the Parthian and Persian ter. and the lack of a formidable enemy to unite these people became the cause of P.'s undoing through revolts and civil wars.

During the reign of Artabanus IV. (A.D. 209-26) the satrap Artabazid revolted and defeated Artabanus in three great battles (A.D. 226); took possession of Ctesiphon, and assumed the title of king of kings of the Persians. He was the founder of the Sassanian dynasty. He restored the religion of Zoroaster, and the Magi became the great influence in the country. His son, Shapur I., succeeded him (240-273); he defeated the Romans at Edessa, taking the Emperor Valerian prisoner (A.D. 260). During his reign the unfortunate Mani founded his new cult (see MANICHEISM). After Shapur's death sev. incapable kings followed. Khosro Parvez, 'the Conqueror,' succeeded in 590. He carried his arms to the gates of Constantinople, where he was defeated by the Emperor Heraclius (617). He was

finally murdered by his nobles, led by his well-loved son, Siroes.

With the accession of Yazdigird III. (634), grandson of Khosrū II., peace was finally concluded with Rome. But a more dangerous foe was rapidly advancing upon P., fierce with religious enthusiasm. The Arabs defeated the Persians in the battle of Kādīsiya (636). The conquerors forced their faith on the Persians, and Zoroastrianism was almost stamped out everywhere except in Yazd and Kerman, which still remain the waning strongholds of the faith. P. finally became a part of the dominions of the caliphs, and was governed first from Medina, and afterwards from Bagdad. The coinage became Muslim, and Arabic was used as the official language of the country. One caliph of little importance succeeded another until the reign of Mahmud (971-1030), the son of Sabuktigin. His love of learning brought cultured men to Ghazni. Firdausi wrote his patriotic epic, *The Book of Kings*, during his rule. His successful wars against surrounding tribes and his invasions of India have made him famous. His descendants retained a certain amount of authority until the Seljuks seized Khosrān (1055).

These Turks were the founders of the Ottoman Empire. Toghrul the Seljuk was the first of the dynasty, and for the first time since the Arab conquest one real authority ruled P. Alp Arslan succeeded him, followed by his son, Malik-Shah. His Prime Minister was Nizam-ul-Mulk, famous to us as the friend of the poet Omar Khayyām. In the thirteenth century the Mongols invaded P. and the Persian caliphate ended. Sev. Mongol rulers succeeded and these in their turn were conquered and swept away by Timur the Lame (Tamerlane) (q.v.) (1355-1504), who with his hordes of Tatars overran P. and invaded India. P. became merely a prey of his Asiatic empire. In 1499 Ismail, ruler of the tn. of Ardebil, descended from the Sassanian dynasty, raised an army, and seized the throne. The Persians were ready to follow him and drive out the Tatars, not only because he was descended from the Sassanians, but because he was a Shi'ah and a descendant from Ali, the son-in-law of the Prophet. The div. into Sunnites, or Sunnis, and Shi'ahs had arisen after the death of Mohammed, the Sunnis upholding the Caliph Abu-Bekr as the rightful successor of the Prophet, he being the Prophet's friend and father-in-law, and the Shi'ahs regarding him as a usurper, and Ali, the son-in-law of Mohammed, as the lawful successor. In 1499 Ismail was proclaimed the founder of the Safavi dynasty. His fourth and greatest successor was Shah Abbas. After the centuries of misery and conflict his rule, from 1586 to 1628, appeared as the 'golden age.' To-day every good building or every road or bridge is attributed to him. At his death feeble and inefficient men succeeded him. In 1727 the Afghans invaded the country and dethroned Hussein. A Persian robber chief, Nadir Shah (q.v.), defeated and drove

out the Afghans. Nadir became ambitious and, dethroning the young son of Husam (1732), seized the throne and led his conquering armies through Afghanistan into India, where he sacked Delhi. He was murdered in 1747. (Till wars followed till Karim Khan (1759-1779) became king and founded the Zend dynasty, making Shiraz his cap. The last of the Zend dynasty was Lutf Ali Khan. Agha Mohammed Khan, a Kajar chieftain, attacked Lutf Ali, and at length conquered and seized the throne. Lutf Ali was tortured to death, the city of Kerman was the scene of a massacre, and Mohammed Khan demanded 70,000 pairs of eyes to satisfy his lust of cruelty. They were brought to him on plates. He was murdered (1797) by his own attendants, and succeeded by his nephew, Fath Ali Shah, in 1798.

Russia was encroaching, and Fath Ali engaged in a war with that country and lost his Circassian provs. His successor, Mohammed Shah, was not an able monarch. He left the throne to his son, Nasiruddin (or Nasr-ed-Din) Shah (1848), famous as the first shah to visit Europe. This man, by trying to take heat from the Afghans, became involved in a war with England (1856). The Eng. seized Bushire and defeated the army of the Shah. After the Shah's first visit to Europe (1874) he granted a concession to the Indo-European Telegraph Company. The Imperial Bank of P. was also founded, under Brit. management. The shah was murdered (1896) by a tradesman of Kerman. His successor was Mazaflar-uddin Shah, a younger son of Nasr-ed-Din. He was a good-natured man, in delicate health, and possessed with the idea of being absolute monarch. The people, however, were beginning to feel the need for progress and freedom. The birth of the Russian Duma was watched with interest and in 1906 the shah granted his subjects a constitution. He died in 1907, and was succeeded by his son, Mohammed Ali Shah. He swore to uphold the constitution; but refusing to believe his country was struggling towards W. progress, he bombarded his Parliament by way of getting rid of it. He was urged by both Brit. and Russian representatives to uphold his constitution, but he apparently could not grasp the situation, and in July 1909 he was deposed. His son, a boy of eleven, was elected in his stead. This child, Sultan Ahmed Shah, ascended the throne in 1909, but was not crowned until five years later. In 1911 Mohammed Ali, the ex-shah, returned to P., and attempted to reclaim his throne, but was defeated. Russian and Brit. interference still continued in P. Financial difficulties increased, and in 1911 the Cabinet (Democrat) invited Amer. financiers under Morgan Shuster to visit P. Little was accomplished, as Russia opposed Shuster's reforms. Meanwhile Salur-u-Dola, brother of the ex-shah, caused intermittent trouble by plundering and fighting. In 1912 he occupied Kurdistan and threatened Hamadan, but was defeated, and eventually expelled from the

country. During the First World War he was arrested in Transcaucasia by the Brit. when about to attempt the throne once more. The regent returned to P. in 1914 to the coronation of the young shah, but left P. again immediately. On the outbreak of the First World War P. was in a miserable condition, and proclaimed strict neutrality, but this was departed from many times and variously by herself, the Central Powers, and the Entente. The year 1914 found the Russian forces, including the Cossacks, in P. numbering 8000, and the Persian gendarmes 7000. The Persian Gov. troops, whose officers only wore Persian at this time, were useless, and only assisted with robberies and blackmail. In Jan. 1915 Russo-Turkish operations took place in Azerbaijan. These were followed by fighting at Ahwaz, in which the Brit. opposed the Turks in order to save the pipe-line carrying oil from Madan-i-Naftun to Abadan. In the Middle E. Ger. influence was prevalent, and in 1915 further fighting took place near Mashhad. In Oct. 1915 the Brit. Consulate and the whole Brit. colony were forced to surrender. In Nov. the frightened shah wished to join the Central Powers. But was persuaded to remain neutral by Farman Fama. In E. P. Russian and Brit. defences were organised to prevent Germany from entering Afghanistan or Baluchistan, but such an attempt was made before the cordon was completed. In 1916 a struggle between the Russians and the Turks took place in W. P., and in that year a Persian force, the S. Persian Rifles, was organised by the Brit. In Nov. 1916 the Brit. took over the gendarme force, and many miles of route suitable for camel and light-car traffic were built or repaired. In June 1917 the Cabinet of Vusugh-u-Dona fell, and a new cabinet hostile to the Brit., under Ala-u-Saltana, was formed. In the spring of 1917 the Russian troops were successful against the Turks in W. P. In March Baghdad was occupied, but this was followed by the collapse of the Russian constitution. Russian troops withdrew, leaving the whole country to the Brit., with the Persians outwardly neutral. The new Soviet republic of Azerbaijan was formed, with Baku as its cap. Brit. troops marched from India via Baluchistan to Kurasan, while other Brit. troops occupied N.W. P., holding Baku for a short time. In 1918 Britain had complete possession of the country, and in 1919 was about to assume the protectorate of P., but the Persian nationalists, with Soviet encouragement, refused this. The Brit. withdrew and P. regained complete independence. Ministries rose and fell, until finally the Sipahdar Azami, who was then Premier, was ousted in 1921 by a military *coup d'état*, organised by Riza Khan, colonel of the Persian Cossacks. The Cossack regime was accepted by the shah, and was pro-Brit., relations with England improving. Later P. became anti-Brit. owing to conflict with the Iraq Gov. At length Riza Khan, who had been minister of war through

six successive govts., became Premier in 1923. He suppressed a republican movement as well as a revolt of the sheikh of Mohammerah. A commercial treaty with Russia was signed on Aug. 11, 1924. The movement against the shah, who resided in France, made headway during 1925; he was deposed, and the Kajar dynasty came to an end. A new constituent assembly was elected and Riza Khan was elected shah by 257 votes to three. He accepted the throne on Dec. 16, 1925, and was formally crowned as Riza Shah Pahlavi on April 25, 1926. In the same month elections for the new Majlis were held. A revolution to restore the Kajar dynasty was suppressed in Oct. In internal affairs the nominal pacification of the tribes was completed in 1925, by the use of force combined with a true remedying of grievances (e.g. the dismissal of corrupt officials) and a policy of settlement. This latter was achieved by the construction of roads and the building of wells in the Bakhtiyari, Khorrambad, and Kurdistan dists., in which the nomads were induced to live. This policy has not been without good results, though outbreaks have since occurred (as recently as 1937) and isolated acts of brigandage are not unknown in the remoter parts. Shah Riza, once firmly established, used his power largely to enrich himself at the expense of his subjects, and he also sought to strengthen his own position by crushing out of existence all powerful semi-independent Persian magnates, including the sheikh of Mohammerah, who had been firm friends of the Brit. during the war. There were signs of material progress in P. during the regime of Shah Riza but they tended only to obscure the mental retrogression of the people due to the fact that when by 1912 Riza had at length abdicated a whole generation of Persians had been suppressed morally and intellectually. Doubtless, in that period, women had forsaken the veil; new hospitals had extended the work of the Brit. and Amer. missionaries; labour laws had improved the condition of the workers; a new union had been founded and the educational system reorganised; and a Persian national bank had been created. But a succession of puppet govts. had included only second-rate ministers content to yield to their ruler's every wish. The Parliament had become a negligible factor, for the shah decided who should be members and what legislation should be enacted. The press, strictly controlled, sold their advocacy to the highest bidder after the abdication.

In foreign affairs P. vacillated between friendship with Great Britain and with Russia. Friction with Great Britain was ended by a treaty recognising the Persian decision to abolish capitulations, abrogated on May 10, 1928. In Sept. 1928 P. was made a permanent member of the League of Nations. Not until 1929 did the Brit. Gov. induce P. to recognise the Iraq Gov., but relations between Great Britain and P. again became strained, as P. claimed the is. of Bahrain, then under Brit. protection. In May

1929 the Russian-Persian frontier was shaken by an earthquake, causing death to over 3000 persons and destroying eighty vils. A second earthquake in the following year caused further considerable loss of life. In April 1930 the currency was altered from a silver to a gold basis, the silver *kran* being replaced by the gold *rial*. A Ger.-Persian treaty of friendship was ratified in Dec. 1930.

A dispute with the Anglo-Persian Oil Company over royalties ended in the Persian Gov. cancelling the D'Arcy concession. The Brit. Gov., after making a show of naval force in the Persian Gulf, eventually arrived at an amicable settlement with P. and a new concession was ratified in 1933, valid for sixty years. Despite regulating treaties, Soviet economic penetration has continued steadily and from 1936 Russian engineers and technicians poured into the country. Disputes arose in 1939 but, on March 25, 1940, a new commercial treaty was signed covering agriculture, industry, and sea and rail traffic. Ger. infiltration was also on a large scale, notably in the control for a time of the air mail and passenger services. Ger. propaganda immediately before the Second World War and after its outbreak was intensified, but not to much practical purpose. Persian policy towards the blandishments of the W. powers was a combination of 'a plague on all your houses' and apprehension as to the possible outcome. In 1935 the Shatt-el-Arab, the common channel through which the Tigris and Euphrates drain into the Persian Gulf, became the subject of a frontier dispute with Iraq before the League of Nations, but was settled in 1937 by a compromise which recognised the old frontier, except opposite Abadan, the Shatt-el-Arab to remain open to all ships, commercial or war, of both parties. Two treaties, important in Near E. politics, were signed in 1937, one on July 12 between P. and Iraq providing legal machinery for settling disputes within the covenant of the League; the other, the Saadabad Treaty, on July 8, which brought together the four neighbours, Iraq, Turkey, Afghanistan, and P., in a mutual pact of friendship and non-aggression. Whether this pact was a triumph for Brit. or Russian diplomacy or neither must be left to future historians to decide. The marriage of the crown prince of P. to Fawzia, sister of Farouk, king of Egypt, in 1939, was perhaps a symbol of P.'s hopes of closer co-operation between the various Middle E. nations. The infiltration of Ger. nationals was an indication of Ger. hopes of carving out spheres of influence, but when the Second World War broke out, P. declared her neutrality, though the Persian Gov. would seem to have been impressed by the early Ger. victories and by Ger. pretensions to be fighting a holy war against Communism and, to some extent, by the suggestion that Germany would save P. from her old enemies, Britain and Russia. There is evidence that the Nazis were in touch with disaffected elements in P. and were planning a *coup d'état*.

Anglo-Soviet Invasion of Persia.—After the Brit. invasion and occupation of Syria, the Brit. and Russian Govs. turned their attention to the dangerous situation which was arising in P., through the large number (about 2000) of Ger. agents who occupied key positions in that country. Sev. times, in Aug. 1941, the two allied govts. requested the Iranian Gov. to send these agents out of P., a country whose safety was a vital interest of Great Britain and Russia alike, particularly by reason of Brit. interests in the Anglo-Persian oil-fields and of the proximity to P. of Russia's great oil-fields in the Caucasus. The danger was the more obvious from the pressure of the Ger. invading armies through the Ukraine and the possibility that, at any moment, Germany might, if thwarted in the Ukraine, attempt to force a passage to P. through Turkey (Anatolia). In many respects the situation in P. represented a return of the conditions which prevailed during the First World War when, as now, an important section of Persian public opinion regarded Germany in the light of a set-off of Russian influence in N., and Brit.-Indian influence in S., P.

During the diplomatic exchanges in Aug. 1941 the P. Gov. were slow to admit the danger. Faced with their vacillating reply and with the urgency of the problem, the Brit. and Russian Govs. decided to act without further delay. On Aug. 25, Brit. and Soviet forces crossed the Persian frontier, the operations on the Brit. side being under the direction of Gen. Sir Archibald Wavell, commander-in-chief in India, and the naval forces under Sir Geoffrey Arbuthnot, commander-in-chief, E. Indies station. Some opposition was encountered by the forces which were landed at Bandar Sannur, at the head of the Persian Gulf. The Brit. and Soviet authorities indicated that neither Britain nor Russia had any territorial design in P., and referred to the terms of the Atlantic Charter (*q.v.*) drafted by President Roosevelt and Mr. Winston Churchill, in confirmation of this policy. As an earnest of their intentions steps were taken to supply the people of P. with corn, food-stuffs, and other essentials which Axis demands had seriously depleted in their country. The Persian forces consisted of about 150,000 men, fairly well trained and equipped, an armoured brigade, and some 200 aircraft. The Russians crossed the N. frontier and advanced in the direction of Ardabil and Tabriz. The allied double advance continued on Aug. 26, and met with only perfunctory resistance. The Brit. and Indian troops, who crossed the frontier early on Aug. 25, consisted of two forces, one operating from the S., with Basra as its base, and the other taking as its starting-point Khamkin, 100 m. N.W. of Bagdad. The more northerly force passed through Quas-i-Shirin and along the Kermanshah road, encountering but little opposition, though strong resistance was expected at the famous Pallak Pass. The head of the column, comprising Ghor-khas, had already met with some long-range machine-gun and rifle fire as it approached Quas-i-Shirin, but the

Persians soon melted away into the mts. to the N. Brit. hussars of an Indian armoured brigade crossed the frontier N. of Chosroes in a long procession of tanks and armoured cars, and, passing between Quas-i-Shirin and Kermanshah, joined forces with the Ghirkhas and led a further advance towards the Paitak Pass. Another column crossing at Chosroes marched across country to the S.E. towards Gilan, whence they could threaten the rear of any Iranian forces attempting to hold the pass. Yet another column was sent out from Naft-i-Khana to occupy the oil wells. This operation was quickly completed against the opposition of a small Persian force. The inhab. manifested an entirely friendly attitude towards the advancing forces. The following day the Abadan oil installations were cleared of Persian troops and Brit. naval forces sank two Persian sloops and captured four gunboats and eight Axis vessels. The Russians captured Tabriz and a number of other tns. in the N. A Persian admiral was killed but the Allies suffered negligible casualties. The Persian Cabinet now resigned and a new gov. was formed under Ali Faraughi (or Faroughi), who told the Persian Parliament of his gov.'s decision to cease fighting. But although this decision of the Persian Gov. was welcome, the allied objects were not yet attained, and the double advance from N. and S. continued. The Brit. forces now reached and occupied Shahabad, having covered 100 m. of mountainous country in three days. The Russians occupied Urmia, in W. P., near the Turkish frontier and about 110 m. from the Caucasus. At the end of Aug. Persian envoys met the forward Brit. troops with the message that the shah had ordered his forces to cease hostilities. The Russian southward advance had now reached Dilman, W. of Lake Urmia. Two anti-tank guns captured by Brit. troops proved to be of the most recent Skoda (Austrian) manuf. The Brit. forces in the N. area continued to advance on Kermanshah along the same route followed by Dunsterville in his advance on Baku twenty-three years previously. Throughout these operations the R.A.F. fighters played a prominent part by providing protection for forward troops and by dropping leaflets. Some thirteen Persian aircraft were destroyed.

On Sept. 10 the Persian Gov. accepted the Brit. and Soviet armistice terms. These included the closing of the Ger., It., Hungarian, and Rumanian legations, and the handing over to the Brit. and Soviet authorities of Ger. subjects. The terms also provided for the withdrawal of Persian troops from certain parts of the country. There were found to be in P. some 1600 Gers., a number having left before the invasion, and some of these made good their escape, while others were arrested by the Russians at Tabriz. Yet others were found at Ispahan, whither they had fled when they heard that the Russians had come as near Teheran as Kazvin. Among the Gers. were two who had been concerned in the Iraqi revolt

under Rashid Ali. The obligations which the Persian Gov. now undertook added but little to previously existing treaty obligations. But they included the promise of specific collaboration for the forwarding of war material, a useful provision enabling Britain and America to supply arms to Russia in the ensuing winter when access to that country would otherwise be possible only through Vladivostok. But the rounding up of Ger. and other Axis agents was obstructed at every turn by the shah and his chief of police and this involved them in difficulties with the Brit. and Russian Gavs. The shah was now fast losing any hold he might have still had on the sympathy of the Majlis and of the people, especially as it seemed clear that he had actually sent the greater part of the crown jewels, which are national property, out of the country, besides amassing a fortune of millions (some estimates put it at £9,000,000). He abdicated (Sept. 16) in favour of his son, Mohammed Riza (or Reza). His abdication was the sequel to his futile attempts to evade the terms of the agreement with Britain and Russia, and was forced upon him by Persians who had long been dissatisfied with the harshness and rapacity of his absolutist regime. The next day allied troops were on the outskirts of Teheran and the new shah began his reign with promises to amend past wrongs and to govern according to constitutional principles.

P. declared war on Germany on Sept. 9, 1913. After the Teheran Conference (Nov. 28) President Roosevelt, Marshal Stalin, and Mr. Churchill issued a declaration in which their three gov.s recognised Persian assistance, undertook to give P. economic aid where possible, and confirmed their desire for the maintenance of Persian independence, sovereignty, and territorial integrity. Relations between P. and Great Britain and the U.S.A. remained amicable throughout the following year and the legations of those two countries at Teheran were raised to the status of embassies. But friction with Russia arose in Oct. as a result of P.'s refusal to grant oil concessions in the N. of the country, a refusal supported by Britain and America. In April 1946 negotiations between Russia and P., conducted on the Persian side by the Premier Qavam-es Sultaneh, resulted in an agreement by Russia to evacuate all Persian ter. within a few weeks in consideration of exclusive rights during the succeeding fifty years to exploit the oil resources of N. P., and on P.'s side to carry through much needed reforms in the prov. of Azerbaijan (q.v.). The agreement left Qavam, who had succeeded Hakim as Premier, free to deal with the problem of Azerbaijan, which was loth to give up its newly won independence. Negotiations between Azerbaijan and P., however, were successfully concluded in June 1946 whereby the former became once more a prov. of P. but with a certain amount of autonomy. The governor-general was henceforth to be appointed by the central gov. and the local army was to come under the command of the Persian Army. The withdrawal

of Russian forces was completed by May 6 1946. In July Qavam enacted the first labour legislation in P. in the shape of a law which provided for compulsory arbitration in industrial disputes. Parl. elections were held however, in an atmosphere of unrest with Kurdish risings and a dispute with Russia over the oil concessions. The elections of Feb 1947 ended with the return of all the democratic candidates including Qavam but at the same time there was widespread opposition to the holding of elections at all and the unrest became serious enough for martial law to be reimposed. One of the main causes of div in the country was the objection of all political parties to the agreement of April 1946 concerning concessions to Russia. The Majlis contended that the right to grant concessions was vested in them alone and that Qavam's notion was *ultra vires*. Though Qavam offered to resign he was re-elected Premier by the Majlis but at first declined to accept office on the ground that all the Azerbaijan deputies had voted against him. Meanwhile notes came from Moscow accusing P. of violating the oil agreement. Qavam in reply admitted that his own previous discussions with the Soviet were null and void because a law of Dec 1944 prohibited the granting of concessions to foreigners. Nonetheless Qavam lost popular support because all the schemes for social reform of which there had been much talk during the year remained untouched. On Dec 10 the Majlis passed a vote of no confidence in Qavam and soon afterwards Mohseneddin Ibrahim Hakimi became Premier again. The Majlis rejected the oil agreement in Jan. 1949. There was however continued unrest and Hakimi resigned in June 1949 and was succeeded by Hajj foreign minister in the Qavam Cabinet of 1946-47 who was supported by the Democratic party led by Qavam. The extremist left wing (Fudchi) party was dissolved in Feb 1949 after an attempt on the shah's life.

A seven-year plan for economic reconstruction costing £22,000,000 was proposed to be financed partly by oil royalties and partly by the Bank for World Reconstruction and Development and the U.S. Import Bank. The shah visited America at the end of 1949.

ART—Persian art dates from 3000 B.C. and the early period saw many influences particularly that of Mesopotamia. Pre-Islamic art in P. found its best achievement in architecture. (See under **ARCHITECTURE** *Persia* and *above*, **ANTIQUITIES**.) Later, during the Islamic dynasties science work developed that of the twelfth and fifteenth centuries being particularly fine and formed an important part of architectural decoration.

The arts and crafts of the country have suffered greatly from the state of anarchy. The Persians have always been artistic by nature and many art forms have existed though the secret of which has been forgotten through the years of civil war and trouble. Pottery and carpets are the greatest forms of Persian art. Persian pottery

is not so technically perfect as the Chinese but excels in its decoration and ornament. Rhages (Ilav) bowls and vases are particularly beautiful. Ware made at Rhages probably in the twelfth century is creamy white and has beautifully designed decorations of animals and figures sometimes in intense colours. Rhages was also noted for lustre ware and tiles. The enamel work for which the Persians were once famous is a lost art, many tiles, jugs, and basins of this work, exquisite in colour and beautiful in pattern, have been preserved.

Carpets were of two kinds, *gelm*, or woven, and *quah*, or knotted. Lustrous



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A YOUTH HOLDING AN ARROW

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of Persian carpets date probably from the sixteenth century. The designs are many including garden, hunting scenes, medallion patterns, flowers, and vase designs. Animal forms are used a great deal in Persian carpet designs as also in all forms of Persian art. Today Persian carpets are made mostly by the nomads, and Sultanabad is the main centre. Persian textiles are important. Sassanian fabrics were very beautiful and were perhaps made by Syrian workmen; these textiles were of formal design. Early Islamic textiles were of silk fabric with animal designs while later a greater elegance in design was reached followed by the use of scrolls and arabesques. Under the Safavids Persian textiles were noted for their various and intense colouring. Silver work and brass work were ancient industries very little is done now. Carved wood inlaid with ivory and mother-of-pearl is still made to some small extent,

also seal-cutting. Persian painting, although limited by Islamic restriction, is of extraordinary beauty. Miniature painting forms the greater part of Persian painting, and illustrated MSS. were the treasure of kings. A great sensitiveness and flow of line were reached, but it is in their marvellous use of colour that Persian artists most excel. Calligraphy was practised in connection with painting and artistic decoration, but in even greater degree as an art by itself. The Persian art which flourished in art, times influenced (Gk., Rom., and Byzantine art, and was the father of Saracenic art and architecture, which has travelled far since its birth. In recent years there has been little development in art, except in architecture and sculpture in so far as it serves as ornament for buildings. In conformity with the nationalist spirit, new design in building is modelled, not on Islamic tradition, but on the pillars and carving of the Achaemenid palaces at Persepolis and the Sassanid arch of Ctesiphon in Iraq.

LANGUAGE AND LITERATURE. The Persian or Iranian language forms a sub-branch of the Indo-Iranian or 'Aryan' main branch, belonging to the Indo-European (*q.r.*) linguistic family. The most important common characteristics of the language making it differ from Sanskrit, belonging to the other sub-branch of the Indo-Iranian main branch, are as follows: change of the original *s* into the spirant *h*; change of original aspirants, such as *gh*, *dh*, into corresponding medials: *k*, *f*, *p*, before a consonant changed to spirants *x* (*kh*), *θ* (*th*), *φ* (*ph*), and the development of soft sibilants. Persian may be distinguished into Early Persian, used on the monuments of the Achaemenid dynasty (middle sixth century to the second half of the fourth century B.C.), Middle Persian of the Parthian or Arsacid period (250 B.C.-A.D. 225), and of the Sassanian period (A.D. 225-651), terminated by the Arab conquest and domination; with the Persian renaissance (ninth century A.D.) Modern Persian began to flourish.

The ancient Persian inscriptions were written in cuneiform character, which, however, was not a natural development from the Sumerio-Assyro-Babylonian cuneiform writing (*q.r.*) but an artificial creation probably drawn up on official order—externally based on the neo-Babylonian cuneiforms and—as a system of writing being a quasi-alphabet suggested by the already widely circulating Aramaic alphabet (*see under ALPHABET*). This early Persian writing, which was the official script of the Achaemenid dynasty, and was employed from the middle of the sixth century B.C. until the destruction of the Persian Empire by Alexander the Great, consisted of forty-one symbols. Four of them were ideograms (for 'king,' 'province,' 'country,' and 'Avra-Mazda') and one a sign of div. between words; three vowels (*a*, *i*, *u*); thirteen consonants (*kh*, *ch*, *th*, *p*, *b*, *f*, *y*, *l*, *s*, *z*, *sh*, *thr*, *h*) having either the value of a pure consonant or a consonant + *d*; ten symbols for consonants (*k* or *q*, *g*, *t*, *n*, *r*) in two forms: (1)

pure consonant or consonant + *d*, (2) consonant + *u*; four symbols for consonants (*dj* and *r-m*), also in two forms, but (1) pure consonant or consonant + *d*, (2) consonant + *i*; six symbols for consonants (*d*, *m*) in three forms: (1) pure consonant or consonant + *d*, (2) consonant + *u*, (3) consonant + *i*.

The early Zoroastrian Scriptures were called *Avesta*, a term which comes from the Middle Persian or Pahlavi (*q.r.*) form *aristak* (or, as some scholars prefer to read, *apastak*) or the Pazand form *arasta*; the Sanskrit term is *arista*. The origin of this word is uncertain. The Avesta literature was composed in a dialect now called 'Avestic' or simply 'Avesta'; its original home is unknown. The Avesta literature is a complex collection of writings, containing the liturgies, the 'law,' solemn invocations, prayers, and so forth, and is still in use amongst Parsis as 'Bible' and 'Prayer-book' in India and in Persia. The script of the Avesta, known as the Pazand or the Avesta alphabet, is a most cursive writing of fifty signs, probably an artificial creation based on the local scripts. These books, with their later commentaries, constitute the bulk of pre-Islamic Persian literature.

Under the Arsacids the Gk. tongue appears to have been widely used, but after the rise of the Sassanians, Persian again became cultivated, and inscriptions and literature in the Pahlavi language have come down to us. Pahlavi, or rather Middle Persian, consists of Parsik of the Sassanian inscriptions, of Pahlavi of the later Zoroastrian literature up to the ninth century A.D., and of the S.W. Iranian dialect known from texts found in Tūrān (E. Turkestan). They are written in Pahlavi scripts, which seem to have been a natural development from local cursive Aramaic scripts.

Modern Persian is a direct descendant of the S.-central middle-Persian dialect, but the Arabic conquest brought such a revolution in the material and spiritual life of the Persians, that, to mention only one sphere of cultural life, although it did not change the fundamental structure of the language, it influenced it enormously. The Pahlavi script was forced to give way to the Arabic (although the pronunciation of some Arabic letters has been changed: Arabic *d* is pronounced in Persian as *z*; and new letters were created, by employing diacritical marks, for representing the sounds *p*, *ch*, *sh*, and *gh*), and a knowledge of the Arabic language became indispensable to the converts to Islam, for religious worship and the correct reading of the Qur'ān, their new Bible were impossible without it. In consequence Arabic speech and writing have so largely influenced modern Persian, that numerous Semitic words have become 'part and parcel' of the language. Daqiqi, who began the famous *Shāh-nāma* ('Book of Kings'), employs about forty Arabic words in a thousand lines of Persian poetry, and even the great Firdawsi (*see below*), who represents a national spiritual reaction against foreign influence, uses a

certain number of Arabic words. Besides, many Persian savants employed Arabic, which made a ready appeal to them from the time of their conversion to Islam. The influence of the Qur'ān and the tendency, manifested especially in the higher social classes, to consider the employment of Arabic words as more distinguished than vulgar speech, certainly did not foster the cultivation of the Persian. Sa'dī (see below) employed both languages, and 'Omar Khayyām (see below) wrote scientific works in Arabic. The incomparable physician and philosopher Avicenna (Abū 'Alī ibn Sīnā) (see below) could even write excellent poems in Arabic. Indeed much of the best of Arabic literature was the work of Persian writers.

Modern Persian returns as a literary language in the early ninth century. The earliest neo-Persian literary document is a fragmentary poem attributed to 'Abbās of Merv, perhaps of A.D. 809, but the first great modern Persian poet was Rūdāgī (d. c. A.D. 954). With him began what may be called the court poetry of modern Persia. He was followed during the tenth to the sixteenth centuries by Firdawsi (d. 1020), who completed the *Shāh-nāma* (the result of thirty-five years' labour), Anwārī (d. between 1189 and 1191), 'Omar Khayyām ('Omar ibn Ibrāhīm al-Khayyām) of Nishāpūr, a free-thinker, poet, astronomer, and mathematician (d. c. 1123), Nizāmī (d. perhaps 1203), Khāqānī (d. 1199-1200), Sa'dī of Shirāz (d. 1291), Jalāl ad-dīn Rūmī (b. at Balkh in 1207, d. at Konya in 1273), Hāfiz (d. 1389), and Jāmī (d. 1492) - in more or less chronological order. A later poet, of epic fame, is Hāfiz of Jām (d. 1521), and later still is Hāfiz of Isfahān, known as the singer of sweet songs (d. 1781). Nineteenth-century poets of importance are Qā'ānī (Mirzā Habibū 'Alī) of Shirāz (d. 1853), Yāghmā, and Mirzā Serūsh, whose elegant work almost equals that of the classic poets.

An early prose work of a direct style, rare in P., is the *Chahār Maqālāh* ('Four Discourses'), written in A.D. 1157-61 by Nizāmī 'Arāzi Samarqandī. Another early prose work is the *ẖizā* al-Balāmi's trans. of the *Universal History* of Abū Ja'far Mahommed ibn Jarir at-Tabarī (d. 923). The already mentioned philosopher Avicenna (d. 1037) wrote in Persian a vast encyclopaedia, a kind of scientific manual, entitled *Dānish-nāma i 'Alā'* ('Book of Knowledge of 'Alā,' 'Alā' being the shortened form of 'Alāu 'l Dawla of Isfahān, for whom this work was written), besides many characteristic Persian songs of wine, flowers, and love. The most celebrated prose works are Sa'dī's (see above), *Bustān* ('Garden'), and *Gulistan* ('Rose Garden'), written in ornate prose with verse interpolations. In lyric poetry the outstanding work is the thirteenth-century *Mathnawī*, by Jalāl ad-dīn Rūmī (see above), venerated as a bible. Many historians have added their learning to the literature of the country, sev. curious and interesting hist. of India being among their works. The

Persian drama delights chiefly in religious passion plays and melancholy tragedies and lately not a few Christian legends have been dramatised, but they have not excelled in this branch as in poetry and religious philosophy. Poetry remains to-day the most flourishing form of literature. One of the main inspirations of poetry has always been the beauty and facility of the language, but the verse-forms are restricted, with few exceptions, to (1) the *rubā'iy* or quatrain; (2) the *ghazal*, a poem in couplets, interlocked by a single rhyme at the end of each couplet; (3) the *qasida*, a dedicatory poem, similar in form to the *ghazal*, but longer; and (4) the *mathnawī*, an epic or narrative poem in rhymed couplets. The recent revival of literature in P. has taken the form of hist., eds. of the classics, and poetry. Interest in novels is restricted to trans. of European works, generally Fr. Persian poetry is frequently didactic and naive; some poems are based on classical models, and are all concerned with modern topics, especially the burning questions of the day.

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Persian Architecture, see ARCHITECTURE, *Persia*.

Persian Cat, see under CAT.

Persian Gulf, inlet from the Indian Ocean, running northwards through the strait of Ormuz between Arabia and Persia. Its area is about 75,000 sq. m., its average depth only 25 fathoms. The climate is exceedingly hot, the temp. of the water rising above 90° F. at times. The Shat-el Arab, formed by the union of the Tigris and the Euphrates, flows into the head of the P. G. There are sev. is. dotted about; the largest are Bahrein, Ormuz, and Kishm. Bahrein is interesting, possessing hundreds of mounds, tombs of some ant. people whose identity has not yet been proved. Date-groves flourish, and springs of clear, fresh water flow through the is.; pearls are diverged for in the surrounding sea, the divers risking their lives against the sharks and sword-fish. Bushire is the most important port; Shiraz, the ant. cap. of the Zend dynasty, being within reach, made Bushire in early times a prominent place. From here the P. G. is policed and order kept among the fierce and ignorant people who inhabit the fringe of the coast. Indian steamers come to trade here, the date trade being very extensive, also the pearl fisheries are valuable, and a certain amount of dried fish is exported.

Further N. is the tn. of Basra, once the landing-place for jewels, spices, and materials brought from India, while the little is. of Ormuz was the distributing centre of this trade in the Middle Ages. One of the benefits accomplished by the Brit. was the suppression of the slave trade, which at one time flourished in the P. G. All along the coast are to be found nomad tribes of all kinds, whose greatest possessions are their horses. See Sir A. Wilson, *The Persian Gulf*, 1928.

Persicaria, see POLYGONUM.

Persimmon, see DRY PLUM.

Personality, in philosophy, denotes that a substance is constituted a person, that is, a substance perfectly subsistent, master of its own acts, and incommunicable. A human person, therefore, is neither the body nor the soul, but the rational being arising from the substantial union of both. It is an individual able to direct itself by its intelligence and will, and is accordingly the proper object of attribution of its acts. It is the person who eats, walks, talks, speaks, loves. While the reality of self has been denied by Hume and Bradley modern philo-

sophers have been principally concerned with four questions regarding the person: (1) Whether and how it knows itself; and the general opinion is that it knows itself by perception, i.e. by that species of awareness which we have of the existence of particulars, by a direct cognitive relation to them, and not by description. (2) The relation of P. to time; and it is agreed by most that the identity of the person persists through time, whatever theory of time be held. (3) Whether P. be simple or compound. The definition given above involves the simplicity of P. (4) Whether P. involves self-consciousness. Opinion on this is divided, though it would appear that differences are largely differences of terms, and it is safe to hold that the person is at all times fundamentally self-conscious.

P. in psychology (*q.v.*) has a somewhat wider connotation, signifying those collections of attributes or qualities which vary from person to person, rather than those which distinguish personal from non-personal existence. For P. in the God-head see TRINITY. See also HALLUCINATION; HYPNOTISM; ILLUSION; MEMORY. See A. Binet, *Attributions of Personality* (trans., 1896); T. A. Ribot, *Diseases of Memory* (trans., 1882); C. A. Méréter, *Psychology, Normal and Morbid*, 1901; C. G. Jung, *Psychological Types or the Psychology of Individuation*, 1923; R. Martin, *Alfred Binet et son œuvre*, 1930; C. R. Stockard, *The Physical Basis of Personality*, 1931; F. Aveling, *Personality and Will*, 1931; M. B. Greenberg, *Personality*, 1933; and V. M. Bechterev, *General Principles of Human Reflexology; the Objective Study of Personality*, 1933.

Personal Property, in Eng. law, comprises all chattels or movables such as jewels, money, documents, furniture, and personal effects or belongings as opposed to real estate (*q.v.*) or interest in land (see PERSONALTY; REALTY; INCORPORAL HEREDITAMENTS; CORPORAL HEREDITAMENTS). Leaseholds or chattels real (*q.v.*) are, as their secondary name implies, a hybrid species of property; for though derived out of real estate, they have been ranked as such and always devolve in intestacy as personality (see DISTRIBUTIONS, STATUTES *OP.*). P. P. is said to be either in action or in possession as to which distinction see under CHOSE IN ACTION. In Scots law the classification into heritable and movable property is almost parallel to the Eng. real and personal.

Personality, synonymous with personal property (*q.v.*). The div. into realty and P. is traceable to a time when legal process was not sufficiently advanced to secure to a person wrongfully deprived of property other than freehold land its specific recovery as compared to an action for damages against the person; but action to recover land was said to be a real action (Lat. *res, thing*), because the law issued process of execution against the thing demanded instead of putting the claimant off with damages.

Personation, see under ELECTIONS.

Personnel Selection, see under MENTAL TESTS

Persons, Robert, see PARSONS

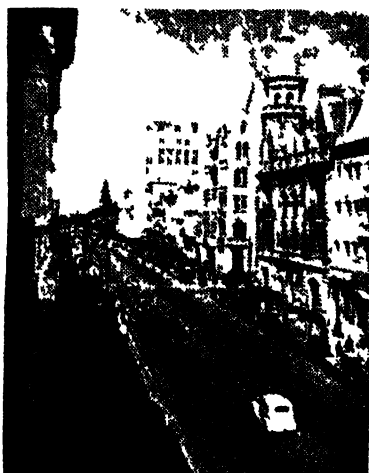
Perspective The method of drawing by radial projection to show the apparent size and shape, or eye appearance of an object is called linear P. It considers all points in a view as sending straight rays of light to the eye the actual condition of things which produces the photograph in a camera. Since all lines converge to the eye if two be drawn from the top and bottom of a telegraph post a 100 yds distant smaller and smaller posts would fit the lines the nearer they approach the eye and posts of the same size would overrun them thus appearing larger the distant post much smaller. Hence the great rule of P. receding parallel lines converge to a point on the horizon or eye level. Aerial P. has no mathematical basis and deals with the eye effect of brightness and colour and other accidents due to atmosphere. See W. L. Wyllie *Nature's Laws and the Making of Pictures* 1905; G. A. T. Middleton *The Principles of Architectural Perspective* 1903; R. V. Cole *Perspective* 1921; V. Cornish *Security and the Sense of Sight* 1943; F. Midworth *Perspective* 1946 and works by J. W. Miller (1887) and H. A. James (1885).

Perspiration, see DERMATOLOGICS SKIN

Persulphuric Acid or Perdisulphuric Acid ($\text{H}_2\text{S}_2\text{O}_8$) acid formed at the anode by the union of the ions HSO_4 during the electrolysis of moderately strong sulphuric acid. The pure acid forms colourless crystals that are stable up to 60°C. It is dilute and its salts have the general formula $\text{M}_2\text{S}_2\text{O}_8$. The potassium salt is obtained by the electrolysis of a strong solution of potassium hydrogen sulphate. The persulphates are stable salts in the solid state but aqueous solutions evolve oxygen and pass into sulphates. Free acid and salts are oxidising agents and give no reaction with barium chloride. Permanganic sulphuric acid or Caro's acid has the formula H_2SO_5 and is prepared by the action of sulphur trioxide upon anhydrous hydrogen peroxide $\text{H}_2\text{O}_2 \rightarrow \text{SO}_3 \cdot \text{H}_2\text{O}_2$. It forms white crystals melting at 4°C and is a powerful oxidising agent. The acid finds commercial use in the dye industry.

Perth, Sir James Eric Drummond, sixteenth Earl of (b 1876) British diplomat & at Kulsford near York second son of tenth Viscount Strathallan and half brother and heir presumptive to the fifteenth earl of P. Educated at Bedford Grammar School and Eton he entered the Foreign Office in 1900. He was secretary to under secretary of state for foreign affairs, 1906-8 and 1908-10. He was the principal writer to the foreign secretary 1908 and 1910-11. One of Asquith's private secretaries 1912-13, and private secretary to the foreign secretary, 1913. 1919, from 1919 to 1933 he was the first secretary general to the League of Nations. British ambassador to Italy 1933-39. He was chief adviser on foreign publicity at the Ministry of Information 1939-40. He became a Scottish representative peer in 1941.

Perth 1 Cap. of Perthshire Scotland, a royal burgh 43 m N N W of Edinburgh. It is beautifully situated on the banks of the Tay with a fine background in the Grampians. The riv. is spanned by two fine bridges, and along its banks are two public parks known as the N and S Inches. Reputed to have been founded in c. 70 by Agricola the oldest building is the cruciform church of St John of the thirteenth century. The city was the scene of the murder of the duke of Cornwall by his brother Edward III of England (1336) of the famous battle between the clans Quhele and Chattan, described in Scott's *Four Maid of Perth* and of Knox's Reformation sermon



Perth, New South Wales, Australia
ST CLAIR'S TERRACE, PERTH, AUSTRALIA

There are many manufactures iron foundries dye works glass ware and gunge glasses. Pop 40,500. 2 Cap. of W. Australia on the Swan R. near its mouth 12 m N E of the port of Fremantle. It has two cathedrals (Roman Catholic and Anglican) a free university an observatory a branch of the royal mint, and many substantial public edifices. There are many parks racecourses and sport grounds etc. nearby. Founded in 1829 it was created a municipality in 1836 and its more rapid growth commenced following the discovery of gold in 1891 at Kalgoorlie. Since then its expansion has been based on the export of primary products such as wool wheat fruit, timber dairy produce and later gold. Pop (with suburbs) 272,500. 3 Cap. of Lanark co., Ontario, Canada on the R. Tay, 141 m S W of Montreal. It has manufactures of machinery, woollens etc. Pop 5000. **Perth Amboy**, port of Middlesex co., New Jersey, U.S.A., at the mouth of the Raritan R. It has an excellent harbour

and manufs. bricks, terra-cotta, corks, drain pipes, and chemicals. Settled in 1683, and named after the earl of Perth, it was the cap. of the prov. from 1684 to the time of the revolution. Pop. 41,000.

Perthshire, inland co. of Scotland, bounded on the N. by Inverness-shire and Aberdeenshire, S. by Clackmannanshire and Stirlingshire, E. by the co. of Angus, and W. by Argyllshire. It is extremely mountainous; in the N. are the Grampian Mts., of which the greatest elevations are Ben More (3984 ft.) and Ben More (3843 ft.), while in the S. are the Ochil and the Sidlaw Hills. The prin. rivs. are the Tay, the longest riv. in Scotland, with its numerous tribs., and the Earn and the Forth. The scenery, wild and picturesque, has been immortalised in *The Lady of the Lake*. The lakes are numerous and include Loch Tay, Loch Earn, and Loch Katrine. Only a small portion of the co. is under cultivation, but agriculture flourishes and sheep are extensively reared. Granite, freestone, limestone, and slate are quarried, coal and copper are found in the Ochil Hills. Perth (q.v.) is the co. tn. Communication is good, and the co. is fit for its sport, and the Tay fisheries are important. Woollen and tartan stuffs, cotton goods and linen are manufactured. P. and Kinross form two parl. divs., each returning one member. It includes such famous places as scene, where the Scottish sovereigns were crowned (the Coronation Stone was removed to Westminster in 1296), Dunsmuir, where Macbeth was defeated (1054), and Killecrankie, the scene of Dundee's great victory (1689). There are many remains of prehistoric stone circles and standing stones, and sev. Rom. sites of interest. Dunkeld Cathedral is of interest. Area 2194 sq. m. Pop. 128,700. See T. H. Marshall, *History of Perthshire*, 1849.

Pertinax, Helvius, Rom. emperor from Jan. 1 to March 28, A.D. 193, was reluctantly persuaded to accept the purple on the death of Commodus. But having attempted to check the licence of the praetorian troops, he was slain by the latter, who then put up the empire for sale.

Perturbations are deviations from the main mathematical orbits of motion of the heavenly bodies due to smaller or irregular attractions. A periodic perturbation is an inequality produced in the orbit due to the temporary nearness of an attracting body. The solar system having a settled 'average system' of orbits with calculable disarrangements due to alteration of relative positions, periodic P. are temporary disturbances which pass and recur. They are of very great use in determining mass, density, and distance. Secular P. are changes in the elements of orbits (see OMBR), which continue in the same direction for centuries; they are themselves periodic in long cycles of scores of thousands or hundreds of thousands of years. One of sev. important secular P. is the alternate increase and decrease in the eccentricity of the earth's orbit; at the beginning of 1850 its value was 0.0187301 and it decreases by 0.0000004

each year, so that the earth's orbit is slowly becoming more circular. This decrease will continue for 24,000 years but will not reach zero, and then will begin to increase. Although Lagrange and Laplace found that P. in the solar system are oscillatory so that our system is stable, Poincaré's work suggested that this need not necessarily be true. While this question cannot be decided at present it is possible that in an immensely long period of time the present conditions may not be preserved, and some of the planets may gradually disappear from the sun's attraction while others may be drawn in by and finally fall into the sun. Lunar P. are of particular importance to us, they are: (1) effect on the length of the month; (2) the revolution of the line of apsides; (3) the regression of the nodes; (4) the evection; (5) the variation; (6) the ann. equation; (7) the secular acceleration of the moon's mean motion; besides many others, theoretically infinite, but about seventy of importance.

Peru, republic of S. America, bounded on the W. by the Pacific Ocean, N. by Ecuador and Colombia, E. by Brazil and Bolivia, S. by Chile. It includes the basin of the Ucayali, with a large portion of the basin of the Marañon or Amazon as far as the Javari trib. The Pacific coast rises steeply for 150 m. inland to the plateaus 6000 to over 12,000 ft., and ranges of the Andes. Area 182,258 sq. m. Pop. (1910 census) 6,208,000 (exclusive of the pop. of forests which is estimated at 815,000). Of the total pop. 3,283,400 were white, 2,817,000 Indian, 12,000 Asiatics, 29,000 Negroes. Lima, the cap., had (1910) a pop. of 223,000. Other tns. are Callao, 75,000; Arequipa, 46,000; Cuzco, 10,000; Iquitos, 10,000; Chiclayo, 35,000; Trujillo, 50,000; Chancha, 20,000; Ica, 20,000; Huancayo, Huamuz, Ayacucho, and Piura, each about 20,000. The area of the republic was long a matter of uncertainty owing to boundary disputes with Chile and Bolivia. Since 1883 Chile had retained the provs. of Arica and Tacna, and all attempts at settling the dispute had failed. In 1929 Tacna was returned to P. and Arica was kept by Chile, but P. received 6,000,000 Amer. dollars compensation, and some 6 sq. m. in the neighbourhood of the port of Arica were also ceded.

NATURAL DIVISIONS. P. falls naturally into three clearly defined and diverse regions. (1) The coastal strip, between the Pacific and the Maritime Cordillera, a sandy desert intersected by fertile valleys and now itself largely made fertile by irrigation. It produces sugar and many other crops. (2) The vast triple chain of the Andes, 250 m. wide, with its great plateaus and rich valleys, grazing land, coffee plantations, and mineral wealth. (3) The Montaña, of the E. Andean slope, with its tropical forests and rivers, but little explored. Of the total arable area of 29,500,000 ac., only 3,600,000 are under active cultivation. In the arid coast region the gov. has brought under irrigation over 60,000 ac. during the last few years.

CLIMATE.—P. is in the lats. of the S.E. trade winds, which, blowing in warm and moisture-laden off the Atlantic, precipitate some of their rain in passing over the pampas, but discharge the body of it on the E. slopes of the Andes, then descending cold and dry on the W. side. Hence there is little or no rainfall on the coastal strip of P. On the Pacific near shore the prevailing wind is parallel to the coast or away from it. In Lima the extreme summer maximum temp. is 82°, winter minimum 56°, the corresponding means being 66° and 59°. The Puna is cold, the lower Montaña is typically tropical, but the higher region is delightful. Light malaria, *paludism*, is common, but yellow fever and plague are rare. The people of pure Sp. blood are not numerous, having so intermingled with the Indians that they are now mestizos or people of mixed race, but their language is Sp., and the higher classes have much culture. Negroes and Asiatics together form between 1 and 2 per cent of the pop. The bulk of the pop. of the uplands, who are known as Cholos, are descended from the original Quechuas and Aymaras of the Inca Empire. They are strong and hardy, and make excellent miners, and the greater part of the work of the country is done by them. Many of them are small peasant proprietors.

OCCUPATIONS, PRODUCTION, AND COMMERCE.—About 80 per cent of the pop. is dependent on agriculture, mainly with the help of irrigation. The chief agric. products are, in the order named, cotton, sugar, wool, hides, skins, and coffee. In the coast region sugar, cotton, maize, alfalfa, and various fruits are grown. Peruvian cotton is of very high quality. Here also is the more modern and energetic life of the country. Callao, Chimbote, and Paita have good harbours, Chimbote being a port for minerals, Paita for cotton. The Lobitos oil-fields have a commercial outlet at Tumbes, and salaverry is the port of Trujillo and the sugar dist. A new port has been developed at Maturani. The forests of the dept. of Loreto have plantations of the coco-nut, and in this remote place the sugar-cane, cotton, coffee, grapes, figs, oranges, pineapples, and bananas grow abundantly, but trade is hampered by lack of transport. Mollendo, one of the worst ports is the outlet for Arequipa, the Titicaca dist., and the Montaña. Huanacavilca is the centre of the quicksilver mines. The uplands are the home of the potato. Lake Titicaca (q.v.), with Lake Poopo and the R. Desaguadero, is a good waterway. Coffee is produced chiefly in Chanchamayo, Perené, Pucartambo, and Huanaco. Coca is extending in Perené. Coca is chiefly grown in Otuzco for the Indian pop., and cocaine is manufactured in Lima, Callao, and Otuzco, chiefly for export. Dyes, cinchona, and other medicinal plants are found; alpaca sheep and llama wool are exported. Rubber is shipped from Iquitos on the Amazon. The gathering of wild rubber, once the most important industry in the Amazon region, was stimulated under pressure

from the U.S. Gov., which agreed to take all surplus rubber for five years from 1912. Copper and petroleum are the chief minerals exploited. The chief copper mine is at Cerro de Pasco, the highest in the world at an elevation of over 11,000 ft. It has been operated for three centuries. P. is one of the world's largest sources of vanadium. Other minerals exported include antimony, lead, tungsten, and bismuth. Gold is widely found, but transport and labour difficulties hinder mining. There are large, mostly unworked, iron deposits, but an iron and steel plant is under construction.

In 1917 the imports were valued at 1,091,957,000 soles, and the exports at 1,002,943,000 soles (the gold sol is worth 47.50 cents (U.S.A.), or 17.38 to the £ (i.e. 13s. 8d.). This was the first unfavourable trade balance in Peruvian hist. Imports are cotton and woolen goods, electrical goods, arms and munitions, dyes, machinery, etc. Exports include cottons, hides, copper bars, petroleum, sugar, wool, mineral concentrates, and precious metals. In 1917 P. exported to the United Kingdom goods valued at £1,102,192, and United Kingdom imports to P. were valued at £2,298,768. In 1918 the estimated revenue and expenditure of P. balanced at 927,000,000 soles. The total debt of P. (1916) amounted to 1,671,720,000 soles, of which the internal debt was 521,000,000. Brit. investments in 1917 amounted to £27,023,000, of which 76 per cent was in default. Amer. direct investments in 1910 were \$81,500,000. Amer. holdings of Peruvian dollar bonds in 1911 were \$51,000,000, all in default.

COMMUNICATIONS. There are about 21,700 m. of roads suitable for motor traffic. The central highway over the Andes was completed in 1935; the rich E. part of P. was made accessible by the Callao Huancayo-Pucallpa highway, opened in 1913; Lima was linked with Iquitos by the Lima Pucallpa highway, completed in 1914. There are good railways, which are carried to remarkable heights, Cerro de Pasco being served by a broad-gauge railway. P. has 27.58 m. of railway. Since 1912 the administration of posts, telegraphs, and wireless service has been in the hands of the gov. There is a short wave and long wave national broadcasting station of modern type. Private stations were suspended in 1912. Air mail and passenger service between Lima, New York, Rio de Janeiro, and Santiago was estab. in recent years.

GOVERNMENT.—P. is governed by a president, who is elected for a term of five years, a senate of forty-nine members, and a chamber of deputies of 153 members, one-third renewable at general elections every two years. Voting is compulsory for all adult literate males. Women have only the municipal franchise. The executive power is vested in the president. Under the constitution of 1933, as amended in 1939, he is advised by an economic advisory council of specialists in various fields. The president exercises

his executive functions through a cabinet holding office at his pleasure. The twenty-four depts. of P. are divided into 124 provs., each dept. being administered by a prefect and each prov. by a sub-prefect.

JUDICATURE.—There is a supreme court at Lima composed of eleven judges and five fiscals, and eighteen superior courts. The judges of the supreme court are chosen by Congress from lists of names presented by the gov.; those of the superior courts and of the minor courts by the gov. from lists of names presented by the supreme and superior courts respectively.

EDUCATION AND LITERATURE.—Education is well organised in P. and is free and compulsory. The system is highly centralised. In 1914 there were 7647 elementary schools, and 61 secondary state schools giving five-year courses. About 100 secondary schools were conducted by religious orders and other bodies. There are also rural schools for Indians, commercial and industrial schools, etc. Besides an excellent univ. at Lima, there are three others, at Arequipa, Cuzco, and Trujillo. Few of the republics equal P. in culture and literature. Felipe Pardo y Aliaga (*d.* 1868) was a brilliant man of letters and the author of sev. sparkling comedies. Manuel A. Segura (*d.* 1871) was also a distinguished dramatist. Among many poets Pedro Paz Soldán y Umanue (*d.* 1895) was the chief in the nineteenth century. Ricardo Palma (1832-1919) was an important writer of Peruvian hist.; José Santos Chocano (*c.* 1875-1931) is perhaps the most powerful of all Sp.-Amer. poets. Religious liberty exists, but the Rom. Catholic faith is protected by the State. A decree of 1929 allowed only Rom. Catholic religious instruction in schools. There is a Rom. Catholic archbishopric at Lima, dating from 1510, and eighteen bishops and vicars-general.

DEFENCE.—Military service is compulsory and universal, but, ordinarily, only a limited number of the yearly quota of conscripts is called up for active duty with the colours. The term of service is two years in the active army, ten years in the reserve, and twenty years in the National Guard. The authorised estab. of the army in 1940 was 2000 officers and about 30,000 other ranks. Aviation, civil and military, is controlled by the Ministry of Marine and Aviation. The U.S. Gov. sent fifty aeroplanes in Lend-Lease terms in 1942. The Peruvian Navy comprises two obsolete cruisers (1906) of 3200 tons with 6-in. guns, two destroyers, four submarines, and six riv. gunboats. There is a naval cadet school near Callao and a submarine base on San Lorenzo Is., opposite Callao.

HISTORY.—P. was conquered (1531-1541) by Francisco Pizarro, and remained under Sp. rule till 1821. The country enjoyed an uneventful and prosperous hist. Lima was the centre of Sp. rule and trade, and in every respect the chief city of the New World. Here, in 1551, was founded the univ. of San Marcos, the first on the Amer. continent. From early times Jesuit missionaries were at work,

spreading culture and enlightenment. The War of Independence lasted some three years, and the Spaniards were finally defeated at Ayacucho (1821). When P. became independent, for a long time its record was one of perpetual civil strife. After the middle of the century prosperity was being estab., but it was shattered by a disastrous war with Chile (1879-83). The nitrate fields of Tarapaca, which were the main subject of dispute, were lost, and Arica and Tacna were also retained by the victors; as shown above, that matter was afterwards settled. Financially P. was ruined, and in 1890 the Peruvian Corporation took over the foreign debt in return for a sixty-six years' lease of railways and many other valuable concessions. Boundary disputes between S. Amer. states are, however, a frequent source of armed conflict, and in 1932, Peruvian filibusters from Iquitos occupied Letícia on the Colombian frontier, demanding a revision of the treaty settlement ratified by P. in 1927. The Peruvian Gov. supported the filibusters and broke off diplomatic relations with Colombia. The League of Nations, on Colombia's appeal, pronounced against P.; after a few months' skirmishing and bombing, a League commission was appointed to administer Letícia until a settlement was reached between the two countries at Rio de Janeiro in 1934. In 1939 98 per cent of the electorate approved amendments to the constitution of 1933 by which proportional representation was abolished and general elections replaced by a renewal of one-third of the chamber biennially. In 1911 fighting took place between Peruvian and Ecuadorian troops for some weeks over a boundary dispute, respecting the region N. of the Marañon from the Pongo de Manseriche, which, however, was settled. P. broke off diplom. relations with the Axis powers on Jan. 21, 1942, and the U.S. Gov. made a loan to P. of \$29,000,000 for defence purposes. A trade treaty was also concluded with the U.S.A. for the disposal of Peruvian cotton and rubber surpluses. P. declared war on Germany and Japan in Feb. 1945. Though taking no active part in the war, the country supplied valuable raw materials to the Allies. It became a foundation member of the United Nations.

ANCIENT CIVILISATION.—Archaeological remains of the country take us to much earlier forms of culture than those of the Inca. Geographically P. can be divided into three zones, the Coast, the Sierra, and the Montaña. The most discussed problem of Peruvian archaeology is whether the cultural priority goes to the prehistoric culture of the Sierra or to that of the Coast zone. According to J. C. Tello, the priority is to be given to the 'autochthonous' people of the Sierra, to the culture of early Tihuamaco and Chavin. Accord. to him archaeological traces of the Chavin culture may also be found at Lambayeque, Anón, and Paracas. On the other hand M. Uhle distinguishes the following five phases of prehistoric Peruvian cultures, of which the first three are in the Coast zone: (1) S.

valleys: Early Nasca or Nasca I. and the two Inca periods; (2) central valleys: Proto-Lima (Nieveria) and Recuary; (3) N. valleys: Early Chimu or Chimu I. (Trujillo) and Late Chimu or Chimu II. (Chanchán); (4) the Sierra, with the cultures of Havin and Tiahuanaco I., followed by Tiahuanaco II.; and (5) the Inca or Cuzco culture. The chronological problems are still open. Reliable dates the Coast cultures from A.D. 700, the Sierra culture from 500 to 1000, and the Inca culture, in its zenith, from 1300 to 1500. According to other scholars (e.g. E. Seler) the two cultural groups (Coast zone and the Sierra) were roughly contemporaneous. The Inca Empire flourished from the first Inca, Manco Capac (Capac), about A.D. 1000 till Pizarro's arrival and the defeat and death of Atahualpa in 1532. It extended over P., Bolivia, and Ecuador, and its influence extended even to the Gran Chaco. The cap. was at Cuzco (q.v.), and Quito was another important centre. A complete system of roads was estab. It is their buildings which make the Incas chiefly worthy of admiration, of which the most remarkable are at and around Cuzco, including the great fortress of Sacahuaman, the Temple of the Sun, the palaces of Huayna Capac and of Pachacuti. The ruins of Machu Picchu (q.v.) are of great beauty, and it is believed that the city was the traditional Tampu-tocco, cradle of the Incas. A road was opened in 1948 by which access to the site is gained. They are composed mainly of most remarkable monoliths, some nearly 20 ft. high, and were fitted into their place by workmen who knew no mechanical contrivance and used no mortar. They had considerable proficiency in astronomy, as we find from the remains of their observatories. Bronze and copper cutting tools were used, but iron was unknown. Skilled and beautiful metal work in gold and silver, pottery, and textile fabrics have been preserved.

Religion.—There are temples of the sun and moon; their 'unknown God,' a supreme spirit, all-pervading, was worshipped without idols or human sacrifices. The image of the Creator was represented at Cuzco by a large flat plate of fine gold, of an oval or elliptical form. The sacred fire of the sun was attended by vestal virgins. Manco Capac, the first legendary Inca, was, according to legend, born of a virgin and came as a redeemer of mankind and a teacher of civilisation.

Agriculture was advanced, and the system of terrace culture was admirably adapted to the mts. Land was held on a communal system, one part being reserved for the Sun temples and priests, another for the Inca, and a third for the people. Each Indian was given a measure of land, and, as soon as he had a family, a further allowance was given to each member. Idleness was punished. Poverty and destitution were unknown, old and infirm being cared for by their neighbours.

The Inca Gov. estab. storehouses as a precaution against famine and to secure that the common produce of the people's labour should be equitably distributed.

In all respects, as far as we know it, the social and political system was admirable. The gov. was a benevolent despotism, interfering with the lives of its subjects at every turn with sumptuary laws and all manner of regulations in the minutest matters of daily life, and such a system was well suited to the docile nature of the people. Conquered peoples were well treated and induced to join in the Incan system. Garcilasso, the Sp. chronicler to whom we are indebted for the greater part of our knowledge of the Inca regime, declares that no anct. kings, whether of Asia, Africa, or Europe, have even shown such wise and benevolent treatment of their subjects.

See T. C. Dawson, *The South American Republics*, 1903-4; F. P. Martin, *Peru of the Twentieth Century*, 1911; W. H. Prescott, *The Conquest of Peru*, 1847, 1906; Sir Clements Markham, *Peru*, 1881, *The War between Peru and Chile*, 1883, *A History of Peru*, 1892, and *The Incas of Peru*, 1910; C. R. Knack, *The Secret of the Pacific*, 1908, *Peru*, 1908, and *The Republics of South and Central America*, 1922; G. Guinness, *Peru: its Story, People, and Religion*, 1909; E. C. Vixian, *Peru*, 1914; A. Dell, *Llama Land*, 1927; W. M. McGovern, *Jungle Paths and Inca Ruins*, 1928; P. A. Means, *Ancient Civilizations of the Andes*, 1931, and *Fall of the Inca Empire and the Spanish Rule in Peru*, 1930-1932; J. Basadre, *History of Peru*, 1938; J. Válega, *History of Peru* (Lima), 1938; A. M. Renwick, *Handicrafts in the Peruvian Andes*, 1939; and C. Sandeman, *A Wanderer in Inca Land*, 1948.

Peru: 1. Co. seat of Miami co., Indiana, U.S.A., on the Wabash R., 16 m. E. of Logansport. Pop. 13,000. 2. Tn. of LaSalle co., Illinois, U.S.A., on the Illinois and Michigan Canal. It is the centre of valuable coal-fields, and has foundries and zinc-rolling mills. Pop. 10,000.

Peru Balsam, see BALSAM.

Perugia: 1. Prov. of Central Italy, forms the compartimento of Umbria. Area 3770 sq. m. The region is traversed by the Apennines, and is watered by the R. Tiber. The soil is productive, the chief products being wine, wheat, oil, and fruits; coal and iron are found. Pop. 713,000. 2. Cap. of the above, situated between the Tiber and Lago Trasimeno, at an altitude of 1700 ft. above the sea level. It contains many buildings of interest, including the Gothic cathedral of San Lorenzo (fifteenth century), the univ. (thirteenth century), palazzo del Municipio (1281), and the collegio of San Severo. The tn. possesses many art treasures, and has a romantic hist. In the Second World War the city escaped damage but the Gers. blew up the thirteenth-century Ponte S. Giovanni. Pop. 82,000. See W. Heywood, *History of Perugia*, 1910, and M. Symonds and L. Duff-Gordon, *Perugia* (Medieval Tns. series), 1898.

Perugia Lake, see TRASIMENO LAKE.

Perugino, Pietro, properly Pietro Vannucci (1446-1523), It. painter, one of the masters of the Umbrian school, b. at Città

della Pieve, near Perugia. He was a pupil of Lorenzo di Lorenzo, and his first public work was the execution of the frescoes in the Palazzo Comunale in Perugia (1475). In 1480 he was one of the group of artists chosen by Sixtus IV. to embellish his newly finished chapel, and painted the 'Delivery of the Keys to St. Peter,' a work which particularly shows his method of bringing out in accurate perspective, and with true feeling of the value of distance, the effects of space and atmosphere, a method which his pupil Raphael carried to perfection. P. led a wandering life; in 1499 he painted the beautiful frescoes in the Sala del Cambio of Perugia, but after 1502 he worked mostly at Florence. His 'Virgin Child, Michael and Raphael,' and four other works are in the National Gallery, London. See lives by G. C. Williamson, 1900, and F. Causti, 1931.

Peruvian Bark, or Jesuit's Bark, bark of various trees of the genus *Cinchona*, of the natural order Rubiaceae, introduced into Europe from Peru by the Jesuits as a cure for fever. *C. ledgeriana* is chiefly grown in Java, which produces nine-tenths of the world's bark requirements. See further under CINCHONA; CINCHONA BARK ALKALOIDS.

Peruwelz, tn. in the prov. of Hainaut, Belgium, 12 m. S.E. of Tournai, near the Fr. border. It is engaged in manufs. of leather, ropes, knitted goods, and footwear. Pop. 7600.

Peruzzi, Baldassare (1481-1536), It. architect and painter, b. near Siena. His early work was in imitation of Pinturicchio, but later he was influenced by Raphael. In 1504 he went to Rome, and, aided by Agostino Chigi, was enabled to study its art treasures and the principles of architectural designs. In 1516 he designed for Chigi the Villa Farnesina, for which Raphael painted the frescoes. In 1520 he was appointed architect of St. Peter's, in succession to Raphael, by Pope Leo X., and in 1525 he designed the Ossoli Palace. Among his frescoes and panel paintings executed at Siena is the famous 'Augustus and the Sibyl,' in the church of Pontegiusta. Becoming city architect at Siena on the sack of Rome in 1527, in 1532 he returned to Rome, where he built the Videni and Orsini palaces, and his architectural masterpiece, the Massimi Palace. See A. Donati, *Elogio di B. Peruzzi*, 1879; A. Weiss, *B. Peruzzi: Anteil an dem miderwöchlichen Schmuck der Villa Farnesina*, 1894; and monograph by W. Kent, 1925.

Pesaro (and *Pisaurum*), cap. of the prov. of Pesaro e Urbino, Italy, on the Adriatic, at the mouth of the Foglia, 19 m. N.E. of Urbino. It is an episcopal see, with an old and a new cathedral. The tn. possesses sev. anc. palaces, a musical lyceum, founded by Rossini, who was b. here in 1792, public library and museum. It is a manufacturing centre, the chief products being majolica earthenware, silk, and glass. Flax, wine, oil, cheese, and wax are exported. The tn. suffered much damage from allied bombing and shelling in the Second World

War, and yet more from Ger. mining and deliberate vandalism. The church of S. Antonio was burned out, but its paintings had been previously removed to safety. The cathedral was little damaged. The ducal palace was slightly scarred and the Gers. looted the interior. The Palazzo Toschi-Mosca, which housed the public museum, was destroyed by Ger. mines. No damage was done to the bp. of Rossini, and the Rossini MSS. in the Liceo Rossini were unharmed. Some parts of the Villa Imperiale were badly damaged by artillery fire, some of its sixteenth-century frescoes being damaged. Pop. 31,600.

Pesaro e Urbino, prov. of Italy in the Marche, bordering on the Adriatic. The chief products are fruits, wine, wheat, iron, and silk. *Area* 1120 sq. m. *Pop.* 336,700.

Pescadores, or Bokoto, group of about twelve basaltic is., off the W. coast of Formosa, China Sea. They were ceded by China to Japan in 1895, and returned to China in 1945. Millet and rice are grown and there are good fisheries. *Area* 50 sq. m. *Pop.* about 70,000. See FORMOSA.

Pescara, Fernando Francesco d'Avales, Marquis of (c. 1459-1521), Neapolitan general in the service of Spain. At the battle of Ravenna (1512) he was taken prisoner by the Fr., but was soon ransomed; he served in the war in Lombardy (1515) and was severely wounded at Pavia (1521). He was placed in command of the army of Italy, and was approached by Morone to join the duke of Milan's party in a plot against Charles V. P., however, betrayed the conspiracy to Charles.

Pescara, port on the Adriatic coast in Abruzzi e Molise, Italy, at the mouth of the P. R. It is the cap. of the dpt. of P. (pop. 196,000). P. was occupied by Ger. forces during the advance of Montgomery's Eighth Army in 1943, and was entered by the Brit. forces in 1944. On May 5, 1944, R.A.F. dive bombers smashed the great P. dam, 12 m. S.W. of Chieti, thus destroying the P. hydro-electric works which supplied current to the railways of a great part of central Italy. *Pop.* 52,000.

Peschiera, fortified tn. in the prov. of Verona, Italy, on the Minco, at the S.E. corner of the Lago di Garda, 21 m. N.N.W. of Mantua. *Pop.* 2500.

Pescia, tn. in the prov. of Lucca, Italy, 10 m. E.N.E. of Lucca. It has a fourteenth-century cathedral and an anc. castle. Its chief products are silk, hats, oil, and paper. *Pop.* 18,000.

Peseta, Sp. silver coin, of the approximate value of 54d., containing 100 centesimos.

Peshawar, cap. of the N.W. Frontier Prov., Pakistan, 10 m. E. of the Khyber Pass. It is an important military station, and an important centre of Asiatic trade. P. is connected with Kabul by telegraph, and wireless telegraph connects Kabul with E. Europe. P. was, in the second century, a Buddhist

cap., and from the fifth to the seventh centuries a resort of Chinese pilgrims. Pop. 130,900.

Peshawarun, former great Muslim city in the plain of Seistan, Afghanistan. There is no hist. of it otherwise than in legend, but it is supposed to have had at one time between 50,000 and 100,000 inhab. and, in a much earlier period, to have been garrisoned by troops of Alexander the Great. Conjecture explains its abandonment some twelve centuries ago as due to a climatic change involving water famine and a mass migration. According to some views, the people of P. and the surrounding region travelled 700 m. across mt. and desert to India to found what is now the modern city of Peshawar. An archaeological expedition of the Amer. Museum of Natural Hist. in Oct. 1919 found by chance in the desert 280 m. S. of Herat remains which they assumed were probably those of P. (other great cities in the plain of Seistan which were similarly abandoned were Pulki and Lakh). These remains consist of a great fortress, the domes of mosques, and a massive wall with towers. The buildings, aqueducts, and fountains were found to be in good preservation but the surrounding walls had been eroded by blown sand. Articles brought back included glazed pottery of fine workmanship, iron and bronze tools and utensils, fabrics, and bracelets. In 1949 the museum planned to send a large expedition to Afghanistan in 1950 for study and excavation work.

It is on record that a young Brit. officer, Capt. Charles Christie, travelling through Afghanistan disguised as a horse dealer in 1810, followed the route from Jalalabad on the Helmand through P. to Herat. The site of P. seems to have been sufficiently well attested for it to appear on the map appended to H. H. Wilson's *Antiquities and Coins of Afghanistan* (1841); while H. W. Bellamy, writing in the 1870's, devotes two pages to its remains, which were later visited by members of the Russo-Afghan Boundary Commission.

Peshwa, or **Peishwa**, anct. head of the **Mahrattas** (q.v.). The title was annulled by the Brit. in 1818, owing to the continued hostility of the Mahrattas, and their ter. was annexed.

Pessimism, attitude of mind, which, confronted by the prevailing irrationality, misery, and worthlessness of life, despairs of finding any real happiness, dignity, purpose, or beauty therein. Often the world weariness expressed by, for example, Homer and Sophocles, is in fact but a transient subjective mood. Usually, as for instance in the Heb. Koheleth, in the Gospel, and in some forms of Pantheism (e.g. Brahmanism), the sense of frustration is transcended by a loftier estimate, and it is seen that 'God will bring every work and secret thing . . . into judgment.' When this view is not taken P. results. P. finds its earliest systematic development in Buddhism wherein consciousness can convey only suffering. The existence not only of a supreme Goodness but also of a supreme absolute Being is denied, and the

only refuge offered is that of self-alienation from all desire, hope, and aesthetic sentiment. In this final comatose indifference, when one has realised the vanity and futile nothingness of life, and has overcome susceptibilities to all emotional stimuli, Buddhism finds the greatest expression of human wisdom; it is praise-worthy because it anticipates death, the great relief from all wretchedness. Buddhism is thus the origin of all modern European P. Epicureanism is closely related to Buddhism, since it regards happiness as accidental in life, existing as a temporary negation of sorrow rather than as a positive emotional or rational circumstance. P. appears in the W. with David Hume's *Treatise of Human Nature and Discourse*; but its chief modern exponents are Schopenhauer (q.v.) and von Hartmann (q.v.). The P. of Nietzsche (q.v.) is only incidental to his optimistic ideal of the Superman. Schopenhauer perceives in life only a blind will, an irresponsible and unguided force, which works heedlessly in all directions, and so causes the incongruities, the irreconcilable conflicting impulses of which existence consists. He advocates suicide and deprecates love as helping to propitiate misery. Hartmann prefers the expedient of continuing as things are until mankind has been educated to perceive the significance of oblivion and to take the necessary action. See also STORIES. See J. Sully, *Pessimism, a History and a Criticism*, 1877; E. M. Curo, *Le Pessimisme au 19ème siècle*, 1878; H. Oldenburg, *Buddha* (trans.), 1882; A. Schopenhauer, *Die Welt als Wille und Vorstellung*, 1883-86; C. R. E. von Hartmann, *Philosophie des Unheimlichen*, 1881; and H. Diels, *Der antike Pessimismus*, 1921.

Peso, name of the monetary unit of sev. Lat. Amer. countries, the par value of which varies from 1s. or more in Paraguay and Colombia to 2s. or less in Mexico and the Argentine. It is usually divided into 100 centavos. Following Brit. devaluation of sterling in 1949 the Argentine Gov. readjusted the exchange rate of the P. in relation to the £, the previous rate of 13:53 being changed to 9:10.

Pestalozzi, Johann Heinrich (1716-1827), Swiss educational reformer, b. at Zurich. He studied theology, law, and scientific agriculture, not putting his educational views into practice until he was of middle age. In his attempt to educate his own child 'according to Nature' after the manner of Rousseau's *Emile*, P. discovered the value of the fundamental principles of his master while rejecting his extravagances. In 1775 he gathered together a number of destitute children, to whom he proposed applying his theories; the scheme proved a financial failure, but when adapted in 1798 to an orphan asylum at Stanz, in 1799 at Burgdorf, and in 1805-25 to the institute which he founded at Yverdon (Neuchâtel), his ideas were spread through the various foreign teachers who came to him and influenced the whole course of modern education. He wrote *Abendstunden*

eines Einsiedlers (1780); *Lienhardt und Gertrud* (1781); and *Wie Gertrud ihre Kinder lehrt* (1801). See also EDUCATION. See works on P. by Krüsi, 1875, G. Seyffarth, 1881, De Gulpms, 1889, and Philoche, 1901; also the book compiled in Switzerland under an official committee on the centenary of P.'s death, trans. into Eng., 1928, as *Pestalozzi and His Times*.

Pesth, see BUDAPEST.

Pestilence, see BLACK DEATH; CHOLERA; EPIDEMIC; PLAGUE; SICKNESS; SMALL-POX; SWEATING SICKNESS; TYPHUS.

Pesto, see PESTUM.

Pests, Insect, see INSECTIDES; INSECTS.

Pétain, Henri Philippe Benoni Omer Joseph (b. 1856), marshal of France; b. at Cauchy-la-Tour (Pas-de-Calais). Educated at the military school of St. Cyr, 1876-78, after a course at the school of War, he became a lieutenant in the Alpine Chasseurs, and later a captain attached to the general staff of the 15th Corps at Marseilles. He was successively military governor of Paris, instructor at the École Normale de Tir at Châlons, 1902, and assistant-instructor at the School of War, 1906. Although his fame as instructor was great, he was not made colonel till 1911, when he was placed at the head of the 33rd Infantry at Arras. At the opening of the First World War he was a temporary brigadier-general commanding the 4th Brigade, part of the 1st Army Corps. After being in the retreat from Belgium, 1914, P. was placed in command of the 6th Div., which fought at the Marne, and was soon afterwards in command of the 33rd Army Corps, which covered Arras. After the ineffective 'Champagne offensive,' which he severely criticised, P. was relieved of active command until 1916, when Joffre placed him in command of the army formed to relieve Verdun. Before the middle of March the Ger. advance was checked. In April P. surrendered this command to Nivelle, and took command of the armies of the centre. In May 1917 he became commander of the armies in the N. and N.E. In July 1918, the supreme command of Brit. and Fr. being how vested in Foch, P. was entrusted with the general attack by all Fr. forces. Marshal, Nov. 19, 1918, P. became a member of the Academy, 1929. Vice-president, Council of War, 1920-30, was on Council of National Defence from 1931, and war minister in Doumergue's Gov., 1931. After the Sp. civil war he became Fr. ambas. to Spain. In May 1940 Reynaud called him into his cabinet as vice-premier, but P. had become a tool in the hands of the pro-Ger. Laval (q.v.) clique, though in June, in response to Brit. proposals, he gave an assurance that the Fr. fleet would not fall into Ger. hands. On June 16, convinced that Britain faced defeat, he asked Hitler for an armistice, but it was not until June 25 that he told the Fr. people of its humiliating terms. After this he became 'chief of the Fr. state,' abolished the republican constitution, and substituted a dictatorial system of gov. for that part of France which remained unoccupied until the allied

landings in N. Africa towards the end of 1942. Thereafter P.'s Gov. at Vichy became a mere echo of Ger. will, though in April 1941, when the Brit. forces had conquered the It. E. African Empire, he broadcast a statement that honour forbade France to take any action against her former ally. From April 1942 P.'s position as head of the state was nominal, all effective authority having passed to Laval and Adm. Darlan. He retired from the active political scene by the end of 1943. When the allied invasion of Europe began he appealed to Frenchmen to remain quiescent. Under Ger. threats P. left Vichy and was taken to Belfort and later to Sigmaringen. In April 1945 he voluntarily returned to France, where he was arrested and interned. On a charge of treason he was tried and sentenced to death, this being commuted to life imprisonment. He was taken to the Isle d'Yeu, off the Vendian coast. See G. Suarez, *Le Maréchal Pétain, 1914-40*, 1940; P. L. Michel, *Le Procès Pétain*, 1945; and A. Fabre-Luce, *Le Mystère Pétain*, 1946.

Petaluma, city in the co. of Sonoma, California, U.S.A., 34 m. N.N.W. of San Francisco. Pop. 5880.

Petch, see IPK.

Petchora, or **Pechora**, riv. of Russia, rising in the Ural Mts., after a northerly course turns S.E. and then N. again, finally entering the Arctic Ocean. Its length is about 990 m. Area of basin 130,000 sq. m.

Petoorde, see PETWORTH.

Peter, St., one of the twelve apostles, b. at Bethesda, on the W. side of the lake of Genesareth; during the period of Christ's ministry his residence was at Capernaum. He was married, but we are not told whether or not he had children. His name was at first Simon (or Symeon, Acts xv. 14), which was changed by our Lord into Cephas, an Aramaic word signifying a stone or rock. In Gk. *pe-ta*, whence *Peter*. In conjunction with Andrew, his brother, he followed the occupation of a fisherman. Both were disciples of John the Baptist (John i. 40 f.), by whom they were taught that Jesus was the Messiah. While following their occupation on the sea of Galilee, Jesus called them to be his disciples, promising that he would make them 'fishers of men.' P. received from Christ the 'commission of the keys' and the first place in the apostolic college. The earliest account of the Resurrection (1 Cor. xv. 5) tells of Christ's appearing 'first to Cephas, then to the twelve,' and the early chapters of the Book of the Acts show how P. continued in his position as leader. It was he who punished Ananias and Sapphira. He converted Cornelius, a Rom. centurion, the first Gentile to be admitted into the Church without circumcision. It is supposed that he afterwards preached through Pontus, Galatia, Cappadocia, Asia Minor, and Bithynia. The tradition that he then came to Rome is now generally admitted, not only by Rom. Catholics but also by the best Protestant authorities. Here he is said to have

suffered death under Nero, being crucified head downwards. See W. M. Taylor, *Peter the Apostle*, 1900; A. S. Barnes, *The Martyrdom of St. Peter and St. Paul*, 1933; A. T. Robertson, *Epochs in the Life of Peter*, 1933; and L. C. Douglas, *The Big Fisherman* (life in novel form), 1944.

Peter I., Alexeivich (1672-1725), tsar of Russia, generally known as Peter the Great, b. in Moscow; son of the tsar Alexis (Alexi Mikhailovich). The previous tsar, Feodor, P.'s half-brother, died in 1682 without issue, after naming P. as his successor, to the exclusion of his own full brother, Ivan. This step immediately provoked an insurrection, which resulted



PETER THE GREAT
After Kneller.

in the coronation (July 1682) of Ivan and P. as joint rulers, with the appointment of Ivan's sister Sophia as regent. P., though brutal and suspicious, was of studious habits, and this probably protected him from the jealousy of his half-sister, the regent Sophia, who, seeing him absorbed in military exercises and other studies, had no uneasiness in regard to his ambitions. She, however, soon discovered her error, for P., contrary to her wishes, married (Feb. 1689), by his mother's advice, Eudoxia Feodorovna, and in October of the same year called upon the regent to resign. In the ensuing contest P. was at first worsted but he was speedily joined by the foreigners in the Russian service, with a Scotsman named Patrick Gordon and the Swiss Lefort at their head, the soldiery, who were his antagonist's mainstay, also flocking to his standard. Sophia was shut up in a convent, where she died in 1704. On Oct. 11, 1689, P. made his public entry into Moscow, where he was met by Ivan,

to whom he gave the nominal supremacy and precedence, reserving the sole exercise of power for himself. Ivan only enjoyed his puppet sovereignty till 1696. P.'s first care, on assuming the gov., was to form an army disciplined according to European tactics, in which labour he was greatly aided by Gordon and Lefort. He also strove to create a navy and a merchant fleet. P., thinking the possession of a portion of the Black Sea would best supply the required facilities of accessible sea-board and port, declared war against Turkey, and took the city of Azov after a long siege in 1696. Eager for knowledge he left Russia in April 1697, in the train of an embassy of which Lefort was the head. In the guise of an inferior official of the embassy he visited the three Baltic provs., Prussia, and Hanover, reaching Amsterdam, where he worked for some time as a common shipwright. To his other studies he added the study of astronomy, natural philosophy, geography, and even anatomy and surgery. On receipt of an invitation from William III., king of England, he visited that country, and for three months, spent partly in London and partly in Deptford, laboured to amass all sorts of useful information. He left England in April 1698, carrying with him Eng. engineers, artificers, surgeons, artisans, artillerymen, etc., to the number of 500. He was about to visit Venice also, when the news of a formidable rebellion of the soldiery recalled him to Russia, but before he arrived Gen. Gordon had already crushed the revolt. The Tsarina Eudoxia, suspected of complicity in the conspiracy, was divorced and shut up in a convent.

In 1700 P. entered into an alliance with the kings of Poland and Denmark to make a combined attack on Sweden. Taking advantage of the Swedes being employed elsewhere, he quietly appropriated a portion of Ingria, in which he laid the foundation of the new cap., St. Petersburg May 27, 1703, which in a few years became the Russian commercial depot for the Baltic. In the long contest with Sweden the Russians suffered a series of defeats, but P. had his revenge at last, totally routing the Swedish king at Poltava, July 9, 1709. He next prepared for war with the Turks, who at the instigation of Sweden had declared war against him. In this contest P. lost his previous conquest, the port of Azov and the ter. belonging to it. On March 2, 1712, he married his mistress, Catherine. At the end of 1710 and beginning of 1717, in company with the tsarina, he made another tour of Europe. Soon after this time he ordered the execution of his son Alexei. In 1721 peace was made with Sweden. In 1722 P. commenced a war with Persia and compelled the shah to hand over the three Caspian provs. along with the tns. of Derbend and Baku. On P.'s return to his cap., in Feb. 1722, he promulgated his celebrated law of succession, which enjoined that each tsar should nominate his successor (see PETER II.). See lives by K. Walisowski. (Eng. trans.), 1808; S. Graham, 1929;

G. Oudard (Eng. trans.), 1930; A. Tolstol (Eng. trans.), 1936; and B. H. Sumner, *Peter the Great and the Russian Empire*, 1950.

Peter II., Alexsievich (1715-30), tsar of Russia, b. at Moscow; grandson of Peter the Great by his only son Alexei. On the death of the tsarina, Catherine I., he ascended the throne in 1727, in accordance with a decree of Peter the Great. He died of smallpox at St. Petersburg. During his reign the three Caspian provcs., Asterabad, Gilan, and Mazunderan, which had been seized by Peter the Great, were recovered by Persia.

Peter III., Feodorovich (1728-62), tsar of Russia, b. at Kiel, succeeded the Tsarina Elizabeth on her death in 1762, and his first act was to withdraw from the league of France, Austria, and Russia against Prussia, restoring to Frederic II. the provcs. which had been conquered during the Seven Years war. A formidable conspiracy broke out on July 8, 1762, headed by his wife Catherine, who was proclaimed tsarina as Catherine II. by the guards, the clergy, and the nobility. P., then at Oranienbaum, was compelled to submit. He abdicated on July 10, and four days later was put to death by Orlov, one of Catherine's favourites.

Peter II. (1813-51), prince of Montenegro, ruled from 1830 to 1851. A statesman and a reformer, he was also a poet. He instituted a senate in 1831, revived the national printing press, and did much to civilise his people. He was the last of the Vladikas.

Peter I., Karageorgevich (1844-1921), king of Serbia, b. in Belgrade. He was the son of Alexander Karageorgevich and grandson of Black George, who headed the Serbian insurrection of 1804 against the Turks and who was murdered in 1817 by his rival Milosh Obrenovich, who by guile obtained his recognition by the Porte as supreme chief of Serbia. In 1883 he married Princess Zorka, daughter of the king of Montenegro. He was proclaimed king of Serbia (1903) after the murder of King Alexander Obrenovich and Queen Draga and crowned in 1904. In the First World War he was an inspiration to his troops whom he visited in the field. He shared in the disastrous Serbian retreat across Albania in 1915 and only returned to the cap. in Nov. 1918, being invited, shortly afterwards, to accept the crown of Yugoslavia, the triune kingdom of Croats, Serbs, and Slovacs. See also *SERBIA, History*.

Peter II. (b. 1923), king of Yugoslavia 1934-1945. On the assassination of his father, P. ruled under his uncle's (Prince Paul) regency. The latter planned to join the Axis powers in 1941, but P. led a revolt and assumed power. The Ger. invasion compelled him to seek refuge in England, where he married Princess Alexandra of Greece in 1944. Conflict with other allied govcs. was caused by P.'s support of Mihailovich (q.v.) and his hostility to Tito (q.v.), and in 1945 the new Yugoslav regime abolished the monarchy. P., who had gone to Egypt as a result of his disagreement with the Allies, had his

property confiscated and was deprived of his nationality.

Peter Canisius, see under CATECHISM.

Peter Damian, see DAMIANI, PIERRO, SAINT.

Peter Lombard, see LOMBARD.

Peter Martyr (1206-52), canonised in 1253, was remarkable for his zeal against heretics, against whom he worked vigorously as Grand Inquisitor. He was murdered near Como by catharists.

Peter Martyr (Vermiglio) (1500-62), early Protestant divine. He was in succession appointed abbot of Spoleto, principal of a college in Naples, and later prior of a rich abbey at Garcia. Becoming imbued with Protestant views, and fearing for his life, he refused to attend a council at Genoa and fled to Pisa and then to Zurich. Afterwards he became prof. of divinity at Strasburg. In 1547, at the invitation of Crammer, he came to England and was appointed to the chair of theology at Oxford. On Queen Mary's accession he returned to Strasburg, and in 1556 went to Zurich, at which place he d.

Peter of Blois, or **Petrus Blesensis** (1135-1205), eminent ecclesiastical of the twelfth century. He was b. in Brittany and went to Paris and Bologna to study law, poetry, and oratory. On his way from the latter place to Rome, in 1163, he was taken prisoner by the partisans of the anti-pope, Victor IV. After a period as tutor to the young prince, who was afterwards William II. of Sicily, P. came to England and was made, first, chancellor to the see of Canterbury, and then appointed to the archdeaconry of Bath. On the death of King Henry P. remained in the employment of Queen Eleanor and afterwards was appointed archdeacon of London. His letters and other writings were collected by the order of King Henry II., and are interesting from the notices they contain of contemporary events and manners.

Peter the Cruel, see PIETRO I.

Peter the Hermit (c. 1050-1115), the preacher of the first crusade, was a native of Amiens. It is said that he had already visited the Holy Land before he began his tour of preaching throughout Europe, and that the work was begun on account of a vision he had received in the church of the Holy Sepulchre. He led a somewhat disorderly army eastward, and on its defeat at Nicaea in 1096, he joined Godfrey of Bouillon. At the end of the crusade he returned to Belgium, where he founded a monastery of Augustinian canons at Liege. See CRUSADES.

Peter the Venerable, or **Peter of Montboissier** (c. 1092-1156), i.e. monk, and abbot of Cluny from about 1122 to his death, after which the order is said to have rapidly declined. In about 1130 he wrote his *Enchiridion seu Tractatus adversus Pictrobrum*, was against the disciples of Peter of Arras and Henry of Lausanne, whom he charged with preaching heresy in the S. of France. He took part in the council of Pisa (1134) and is said to have been influential in securing the papal throne for Innocent II. P. is noted for befriending Abelard in his last days.

Peterborough and Monmouth, Charles Mordaunt, third Earl of (1692-1735), Eng. general and statesman. He began his adventurous life at seventeen by serving in the Eng. Mediterranean fleet against the Barbary corsairs. Owing to the hostility of the Eng. court he retired to Holland in 1686, returning two years later with William of Orange, whose cause he had early espoused. On the accession of William III., P. was in succession made privy councillor, first lord of the treasury, and earl of Monmouth. He was one of the Council of Nine appointed to advise Queen Mary during William's absence in Ireland (1690), and in the following year served with distinction in Flanders. After this he retired for a while into private life, mixing with the wits of that Augustan period. From retirement he returned first to politics, and by his duplicity in connection with the proceedings against Sir John Fenwick landed himself in the Tower. His detention there was short, and on the death of William he regained favour. His greatest achievement was his brilliant campaign in Spain during the Sp. War of Succession. His repeated victories were, however, nullified by the stupidity of the archduke Charles and the jealousy of his colleagues. P.'s chequered career continued into the reign of George I., and he d. at Lisbon in his seventy-third year. Macaulay has said of him that he was 'the last of the knight-errant.'

Peterborough: 1. City and municipal bor., situated in the administrative co. of the soke of P. mainly in Northamptonshire, but partly in Huntingdonshire, England, on the Nen, 42 m. N.E. of Northampton. It is a bishop's see and has a fine cathedral, which was formerly the church of the Benedictine monastery of Burgh. The cathedral, the third to be erected on the site, was begun in 1116. Its three-arched W. front gives it a most imposing appearance. There is every kind of architecture from the Norman to the Perpendicular period, and prior to the Reformation it was considered one of the most magnificent in the kingdom. The first monastery, called Medeshamstede, was founded by the Mercian kings Penda, Wulfhere, and Ethelred, assisted by their sisters Kyneburgh and Kineswith and by Oswy, king of Northumbria in the year 635. This building was totally destroyed by the Danes in 879 and the place lay desolate for 100 years. In 972 a new monastery, founded by Ethelwold, bishop of Winchester, was endowed by Edgar the Peaceful. Being fortified with a wall by Abbot Kenulf it acquired the name of Burgh, and so rich did it become that it was referred to by the monks as *Gildenburgh*, the golden borough. The second church was destroyed by fire in 1116 and in the following year the building of the third church was begun by Abbot John de Sais. One of the prin. builders was a former prior of Canterbury and friend of Becket, Benedict, who built the nave. The W. front was completed in the reign of John, and many additions and alterations to the building were made almost up to the time

of the surrender of the monastery in 1539, when the church was selected as one of the six cathedrals to be refounded from monastic churches in 1541 by Henry VIII., on the advice of Crommer. The city was created by letters patent of Henry VIII. on Sept. 4, 1541. Before the monastery was dissolved there had been a small mesne bor. dating back to the Norman era, the tn. growing up around the monastery. Its local administration has contained sev. unusual features, the powers of local gov. being divided formerly between the dean and chapter as lords of the manor, whose steward presided over a court leet held in and for the city, and a rival parochial authority, holding certain tn. estates, known as the *feoffees* and governors of the tn. lands and stock. In 1871 the city became a municipal corporation. It is now governed by a mayor, seven aldermen, and twenty-one councillors. There is a separate co. council for the soke of P. estab. in 1888 with ten aldermen and thirty councillors. The justices of the liberty of P., who exercise their jurisdiction in the city and soke, when sitting in quarter sessions, claim all the powers of a judge of assize but would not exercise their right to try a case of murder. The marquess of Exeter is hereditary lord paramount, an office equivalent to that of lord lieutenant in another co. He also holds the office of *custos rotularum* for life by a grant from the Crown. He is the chairman of the co. council and chairman of the justices in quarter session, though he has appointed the P. co. court judge as his deputy to preside at the sessions.

Amongst events in the early hist. of P. may be mentioned the sacking of the tn. and monastery by Hereward and the Danes in 1071, and the share of the abbey tenants in the peasants' revolt during the reign of Edward II. Catherine of Aragon, the wife of Henry VIII. lies in the cathedral, and Mary Queen of Scots lay buried here for a quarter of a century. In 1613 the cathedral was despoiled by Cromwell and his soldiers, who destroyed most of the monuments and stained glass.

P. is a well-built city, containing many fine buildings and is kept remarkably neat. There is a large market place, markets being held on Wednesday and Saturday. The chief trade of the city is engineering, and the manuf. of agric. machinery, turbines, and Diesel oil engines. There are cattle and corn markets, the well-known fair known as Bridge Fair held during the first week in Oct., and also a famous agric. and hound show in July. The city is a junction of the Midland Region and the N.E. Region railways, and in connection with the latter has large workshops for the manuf. of railway plant. There are also manufs. of bricks in the city at Dogsthorpe and in the dist. adjoining the city in Fletton, Whittlesey, and Etc., besides minor industries. P. formerly sent two members to Parliament but it now forms part of the P. Northamptonshire parl. div. Its pop. is about 45,000.

2. City of Ontario, Canada, adminis-

trative centre of P. co., on the Otonabee R., 70 m. N.E. of Toronto and 28 m. N. of Lake Ontario. It is an important manufacturing centre, with eighty-five industries employing 10,000 persons, with ann. production valued at more than \$90,000,000. It has the largest cereal mill in the Brit. Commonwealth (Quaker Oats) and the largest electrical apparatus plant (Canadian General Electric). It specialises also in the manu. of canoes and boats, motors for watercraft, and clocks and watches. Other products include dairying equipment, yarns, rugs and carpets, woven labels, locks and hardware, food beverages, meat products, canned foods, electrical motors, and finished wood products. The largest deposit of nepheline, used in the manu. of glass, in the world is being mined N. of the city and the refined product is shipped to the glass industry over the world. It is the centre of a beautiful lake dist. which annually attracts thousands of visitors from the U.S.A. and Canada for summer recreation. It is on the Trent Canal, an inland waterway, joining Lake Ontario with Georgian Bay, and the largest of lock in the world is at P. It is the chief commercial centre for central Ontario and its stores supply a marketing area containing more than 150,000 persons. Much of the electrical power is developed near by along the Otonabee R. Pop. 35,500.

Peter, First and Second Epistles of. These two epistles must be considered quite separately: 1 Peter seems to have been written especially to Gentile Christians, but there is no sign of the early dispute about the observance of the law. Though purporting to be the work of St. Peter, its tone is distinctly Pauline, and this, with certain other difficulties, has led to its being regarded as spurious by sev. important modern critics, e.g. Davidson, Julicher, and Harnack. During the early ages, however, it was received without question, and even now it is less difficult to accept the epistle as the genuine work of St. Peter than to accept any of the various theories propounded by its adversaries. With 2 Peter the case is different. No certain trace of this epistle is found in the Christian literature of the second century. During the third century it was received by certain churches, but we find mention of the doubtfulness of its authenticity in such writers as Origen, Eusebius, and Jerome. It is thought to be a work of the second century, a production of the school that also produced the *Apocalypse of Peter*. For both epistles see the articles by F. H. Chase in Hastings' *Dictionary of the Bible*, where also a full bibliography is given.

Peterhead, seaport and burgh of E. Aberdeenshire, Scotland, in Buchan dist., on the N. side of P. Bay. Keith Inch, cut off by the harbour from the tn. proper, has fish-curing (chiefly herring) establs. White fishing has developed since 1945. The celebrated 'P. red granite' is quarried. Shipbuilding, granite-polishing, woollen manu., and fish and vegetable canning

are among the chief industries. The national 'harbour of refuge' was begun by convict labour (1886) and the S. breakwater was completed by 1921, but work is still proceeding on the N. breakwater. There is a submarine cable between P. and Egersund in S. Norway. Pop. (estimated) 13,000.

Peterhof, tn. and summer resort of Leningrad, on the S. shore of the gulf of Finland. Prior to the revolution it was noted for its fine imperial palace and park (1720). 'Monplaisir', built by Peter the Great in the style of Lénâtre with parterres, groves, alleys, water theatre, and bronze fountains, contained interesting relics of himself, Catherine II., and Elizabeth. The palace was ruined by Ger. guns and bombs in the Second World War, and in 1943 all that remained was a shell of blackened, pitted walls. The Gers. even wrecked the water system supplying the fountains. The fountains themselves, including the celebrated Samson, were sent to Germany as scrap metal.

Peterhouse, see PETER'S COLLEGE, ST., CAMBRIDGE.

Peter I. Island, in the Antarctic, is 9 m. long, 1 m. wide, with a height of 1600 ft. It was the first land to be discovered S. of the Antarctic Circle, by Captain F. von Bellinghausen of the Imperial Russian Navy. A certain confusion was later caused in cartography by alternative naming of the is. in this area.

Peterloo Massacre, name given to the happenings of Aug. 16, 1819, in Manchester. On that date a large body, principally composed of workmen, held a meeting in favour of parl. reform, under the leadership of Henry Hunt. The magistrates ordered the meeting to be broken up by the military, including sev. troops of horse; as a result eleven lives were lost and many persons wounded. The meeting took place in St. Peter's Field (now the site of the Free Trade Hall), hence the name Peterloo (in imitation of Waterloo).

Peteromys, see FLYING SQUIRREL.

Peters, or **Peter**, Hugh (1598-1660), Independent divine, son of Thomas Dyckwoode, otherwise P., and of Martha, daughter of John Trellify of Fowey, Cornwall, educated at Trinity College, Cambridge. He emigrated to Holland and then to New England, estab. a colony at Saybrook, Connecticut, and was a co-founder of Harvard College. He became the minister of the first church at Salem, Massachusetts. P. returned to England in 1641 to represent Massachusetts Bay Colony and served with the forces of Cromwell and Fairfax as an army chaplain. He took part in parliamentary politics and pub. many pamphlets and, in 1660, at the Restoration, was tried as a regicide and executed. His name for long was anathematised, but to the adherents of the lost cause he seems to have always been lenient and his acts of kindness to some of the Royalist clergy are recorded in Walker's *Sufferings of the Clergy*. His writings and the pubs. in print and MSS. relating to his life are described in the *Bibliotheca Cornubiensis*.

Peters (Peeters), Jan (1625-77), Flem. marine painter. The 'Port of Oran' is his masterpiece, and his 'Destruction of the English Fleet at Chatham, 1667', is at Amsterdam.

Petersburg: 1. City and port of entry of Virginia, U.S.A., on the Appomattox R., 22 m. S. of Richmond. There are cotton, silk, tobacco, flour, and machinery manufs. and fine granite quarries. During the Amer. civil war P. was almost the last stronghold of the Confederate Army, being defended by 9 m. of fortifications. Against P. Gen. Grant entrenched the Federal Army, and the siege lasted nine months from July 1861. The Federal losses before P. amounted to some 10,000. The present pop. of P. is 30,600. 2. Municipality of Dalhousie co., S. Australia, 70 m. from Port Augusta. It is an important railway junction, connected by rail with Adelaide and other tns. Pop. 2,500.

Petersburg, St., see LENINGRAD.

Peter's College, St., Cambridge, or **Peterhouse**, was founded in the latter part of the thirteenth century by Hugh de Balsam, bishop of Ely, for a master and fourteen fellows. By the statutes of 1882, the foundation was changed to consist of a master, eleven fellows, and twenty-three scholars. There is a large number of scholarships, of which twenty-three are open. The list of masters dates from 1290.

Petersfield, urban dist. and mkt. tn. of Hampshire, England, 16 m. N.N.E. of Portsmouth. It has a medieval church. Bedale's school, a co-educational estab., is near to P. Pop. 6700.

Peter's Pence, also called **Romescot**, **Rom-lech**, tax or tribute imposed by the pope on the Eng. at the beginning of the tenth century, of a penny for every hearth or house, payable at Lammas Day (Aug. 1). From England the practice spread to other countries of Europe. The anti-papal feeling in England which, in the reign of Edward III., caused the passing of the Statute of Provisors, and in Richard II.'s the Statute of Praemunire, did not alter the fact that the pope received an ann. sum of £200 as composition for P. P. during that period, although the tribute was temporarily stopped for a short time in the reign of Edward III. The payment of P. P. and other papal exactions was finally forbidden by an Act passed in 1534. P. P. revived by Pius IX. is now paid as a voluntary offering by Catholics throughout the world.

Peter's, St., church in Rome, see ST. PETER'S.

Peter the Great Gulf (Bay), or **Golden Horn Bay**, wide inlet of the sea of Japan, on the coast of Primorskaya, Manchuria, stretching from the Tumen R. (Korea frontier) to Cape Povorotny. Vladivostok, a terminus of the Trans-Siberian Railway, is its chief port.

Peter the Great Mountains, or **Periokh Tau**, range of Karategin, E. Bokhara, Central Asia, S. of the Vakhsh or Surkhob valley, forming a W. extension of the N. Pamir. The highest peaks are about 18,000 ft., and there are sev. glaciers.

Pethick-Lawrence, Frederick William, first Baron (b. 1871), Brit. statesman, educated at Eton and Trinity College, Cambridge, became a barrister. He ed. the *Echo* (1902-5), the *Reformer's Year Book* (1904-8), and the *Labour Record and Review* (1905-7). In 1901 he married Emmeline Pethick, assuming her surname, and was prominently associated with her in the feminist movement, being imprisoned in 1912 for his activities in that connection. Elected Labour M.P. for W. Leicester 1923-31, he was financial secretary to the Treasury. He took part in 1931 in the Indian Round Table Conference in London. As secretary of state for India, 1945-47, he visited India as a member of the Cabinet mission and took part in the independence negotiations. He was created a baron in 1945. His autobiographical *Fate has been Kind*, appeared in 1943, and he has written on economic matters.

Pethick-Lawrence, Lady (b. 1867), Eng. leader of the women's suffrage movement. Emmeline Pethick was b. in Bristol, and after sev. years of social work in the E. End of London married F. W. Lawrence (later Lord P.), editor and proprietor of the then London evening paper, the *Echo*. Beside, with her husband, a socialist, and in 1906 was made honorary treasurer of the 'militant' women's suffrage organisation, the Women's Social and Political Union, a position she held till 1912. She was sev. times imprisoned for events connected with the suffragette agitation. In 1913 she became joint editor with her husband of the paper founded by them, *Votes for Women*. She wrote *My Part in a Changing World* (1938).

Pethidine, synthetic drug with the formula $C_{15}H_{19}O_2N$ -Hcl, used as an analgesic and as a substitute for morphine, though it is less powerful than the latter. It is useful in childbirth and in asthma, since it causes relaxation of unstriated muscles. The dose is $\frac{1}{2}$ to 1 gr. (10 to 60 mg.) by intramuscular injection.

Petiole, leaf stalk of a plant. It is usually cylindrical and narrow, though occasionally it is elaborated into very remarkable forms, such as the pitchers of pitcher plants.

Pétion, or **Péthion**, de Villeneuve, Jérôme (1753-94), Fr. revolutionist, b. at Chartres. He was prominent as a member of the Jacobin Club and fellow worker of Robespierre. Chosen mayor of Paris (1791) in preference to La Fayette, he then became Girondist deputy to the Convention (1792-93), but was accused of being an accomplice of Dumouriez and proscribed. The exact manner of his death is unknown. See *Curran*, 1793; C. A. Dauban, *Mémoires inédites*, 1866. See life by J. B. Regnaud-Warin, 1796; A. de Lamartine, *Histoire des Girondins*, 1847; and C. Vatel, *Charlotte Corday et les Girondins*, 1872.

Pétis de la Croix, François (1653-1713), Fr. orientalist, b. in Paris, son of François (d. 1695). He became prof. of Arabic at the Collège Royal, Paris (1692). He trans. *Histoire de la Sultane de Perse et des Vizirs*, from the Turkish tales of

Cheikh-Zadeh (1707); *Mille et un jours* (1710-12); and *Histoire de Tiamoor* (*Tamerlane*) (1722) from the Persian. See J. M. Quorard, *La France Littéraire*, 1827-64.

Petit Brabançon, see GRIFFON BRUXEL-LOIS.

Petition of Right: 1. The constitutional means by which alone, until recently, the subject could obtain legal relief against the Crown was by P. of R., for the legal impenetrability of the king, coupled with the fiction that the courts are his own, operated to make it impossible for the subject to sue him by the ordinary means of an action at law. A P. of R. was presented to the Crown through the Home Office, which latter office transmitted it to the attorney-general. Relief by P. of R. could be claimed only for money due under a contract, whether for liquidated or unliquidated damages, or for restitution to or compensation for property of which the Crown had obtained possession; but never for a tort (*q.v.*) alleged to have been committed by the king. Where a tort had been committed by any servant of the Crown, the appropriate remedy was (and is) by action against the servant personally. The Labour Gov., after the Second World War, introduced the Crown Proceeding Bill, to bring the state within reach of the ordinary citizens under the ordinary processes of the law in the courts. This Bill passed the House of Lords and its second reading in the Commons in 1947.

Petition of Right (1628), document embodying parl. demands and presented to Charles I. in 1628 by the Commons. In view of certain unconstitutional practices of Charles the Commons met and resolved themselves into a Committee of Grievances to consider 'the liberty of the subject in person and estate.' The prin. matters discussed were (i.) illegal exactions under the name of loans; (ii.) the arbitrary commitment of those who refused compliance, and especially the recent decision of the king's bench remanding Sir Thomas Darnel and others upon a *habeas corpus*; (iii.) the billeting of soldiers on private persons; and (iv.) the infliction of punishment by martial law. After passing resolutions on the liberty of the subject in these respects the Commons applied to the Lords for a conference, in order to agree on a petition to the king for a declaratory confirmation of these liberties. There followed two months of delay and equivocation by the king. Coke warned the House to proceed by Bill. 'The king's answer is very gracious; but what is the law of the realm?' he asked. 'That is the question. I put no diffidence in his majesty; but the king must speak by record, and in particulars, and not in general. Let us put up a Petition of Right: not that I distrust the king; but that I cannot take his trust, save in a parliamentary way.' The P. of R. was then drawn up by the Commons. The Lords vainly proposed an amendment but eventually passed the petition without any material alteration, and it awaited only the royal assent to acquire the force of law. After further equivocation the king

grudgingly gave the assent in the customary form.

Petitions. The right of petitioning the Crown and Parliament, one of the most valuable possessed by the subject, seems to have been exercised from the earliest times. But for many centuries it was practically restricted to P. for redress of private and local grievances, and the remedies sought were such as have since been provided by courts of equity and by private Acts. The practice of petitioning on political subjects came into vogue during the period of the Great Rebellion, many P., signed by large bodies of people, being presented both to Charles I. and the Long Parliament; and it was probably the recollection of the intimidation exercised by numerous bodies of petitioners in the early days of the Long Parliament that led to the passing of the restraining Act of 1661 against 'tumultuous petitioning.' By this Act it was enacted that no petition (unless the contents had been previously approved by three justices of the peace or a grand jury) should be signed by more than twenty, or delivered by more than ten, persons. By the Bill of Rights the right of the subject to petition the king was expressly sanctioned; but the Commons for a long time showed themselves intolerant of a free expression of opinion, and most jealous of any semblance of interference with their functions. The above mentioned Act of Charles II. has long been practically a dead letter and in ordinary circumstances no one thinks of enforcing it or of inquiring, when a petition is presented, whether its conditions have been complied with.

The procedure of the Eng. House of Commons requires the following rules, *inter alia*, to be observed in the introduction by members of public P.: (1) They must be written, not printed or typed; (2) must be signed by the petitioners and addressed to the House of Commons; (3) must contain no interdictions or excommunications; (4) no documents must be annexed; (5) must be temperately worded; (6) must contain no references to debates in Parliament or to notices of motion not set down in the paper; (7) P. for any sums relating to the public service can be presented only by leave of the Crown; and (8) P. in a foreign language must be accompanied by a trans. The introducing member is responsible for the observance of all rules relating to a petition. All P. are referred to the Public P. Committee. No action for libel can be brought with respect to the contents of a public petition, presented to Parliament. See J. H. Morgan, *Remedies against the Crown*, 1926, and W. S. Holdsworth, 'History of Remedies against the Crown' (in *Law Quarterly Review*, vol. xxxviii.).

Petitio Principii, in formal logic, that species of false reasoning which consists in tacitly assuming the proposition to be proved as a premise of the syllogism by which it is to be proved, or, in other words, in taking the conclusion itself as one of the premises. The nature of this fallacious argumentation is popularly expressed in the phrases, 'begging the question,'

or 'reasoning in a complete circle.' This kind of fallacy frequently occurs in long arguments and in verbose metaphysical writings. Again, as Jevons points out, it is an easy pitfall for those who employ a mixture of Saxon, Lat., and Gk. words in formulating definitions, which on investigation turn out to be mere identical propositions; thus, 'Consciousness must be immediate cognition of an object, for I cannot be said really to know a thing unless my mind has been affected by the thing itself.'

Petitot, Jean (1608-91), Fr. painter in enamel, *b.* at Geneva. In England he met Van Dyck (c. 1634), who introduced him to Charles I. P. painted portraits of the king and his court, and made miniature copies of many of Van Dyck's pictures. A portrait of the duchess of Southampton (1612) in the duke of Devonshire's collection, is considered his masterpiece. At Paris he enjoyed the patronage of Louis XIV. The Louvre Gallery of Apollo contains many of his works. See Cecilia Brightwell, *Mythology of Biography*, and E. Stroehlin, *Petitot et Jourdier*, 1905. **Petits Chevaux**, see ROUTTE.

Petkov, Nicolai (1889-1947), Bulgarian politician, *b.* near Sofia, and a lifelong member of the Agrarian party. After the murder of Stambulski (*q.v.*) in 1923 he spent some years in prison and in concentration camps on account of his opposition to the dictatorship of King Boris and his associates. A strong opponent of Nazism, P. was one of the founders of the Fatherland front (see BULGARIA, *Historical*), signing the Moscow armistice which brought Bulgaria into the war on the side of the Allies (Sept. 1944). When the Fatherland front was formed, P. became deputy Premier, but resigned in Aug. 1945 and went into opposition, thus incurring the enmity of the Communists, who had previously been his colleagues. The elections of 1946, despite intimidation of the opposition, brought the Agrarians about one-third of the votes cast and P. publicly declared that Bulgaria should be governed by an Agrarian-Communist coalition. He was arrested in June 1947 and charged with complicity in a military conspiracy, which he strenuously denied. The conduct of the trial led to a strong protest by Britain and the U.S.A., but P. was sentenced to death and, after the Soviet Gov. had rejected the Anglo-Amer. requests for consultations with a view to the revision of the sentence, he was executed and the Agrarian party dissolved.

Petőfi, Sándor (Alexander) (1823-49), national poet of Hungary, *b.* at Kis Kőrös, who favoured a simple and romantic type of poetry. After a somewhat stormy youth, he settled to a literary career at Pesth (c. 1845), and in his patriotic songs (1847) showed his sympathies with the Hungarian revolutionists. In recognition of his stirring lyrics and odes he has been called the 'Hungarian Burns.' *Talpra, Magyar!* (1848) roused tremendous enthusiasm. Among his chief collections of lyrics may be mentioned (titles trans.) *Pearls of Love* (1845);

Starless Nights (1845); and *Clouds* (1846). His *Collected Poems* appeared in 1846; A. Haas's ed. 1892-96; and Sir J. Bowring's Eng. trans. of selections in 1866. See lives by A. Fischer, 1889, and U. Norsa (Rome), 1923.

Petra (Biblical *Sela*), anct. city of Arabia Petraea (N.W. Arabia), once cap. of the Idumeans and later of the Nabataeans. On the site is the modern Wadi Musa, 70 m. from Akabah. It stood in the bed of a rocky gorge between the Dead Sea and the N.E. extremity of the Red Sea. Edward Lear (*q.v.*) made an expedition to P. which he knew as the home of the children of Esau, cap. city of the fabled Arab race, the Nabataeans. The monuments of P. are both classical and pre-classical; here the Assyrian influence meets the Gk. After the crusaders lost the stronghold of P. to Saladin, P. vanished from the maps and hist., and even the memories of men; until in 1812 Burckhardt rediscovered the abandoned city of stone, a solitude of facades, obelisks, stairways, and passages, an inhuman deadness of nature that was once the site of the Nabataean metropolis. Enclosed in mountainous iron cliffs it presents to-day a ghastly waste of monuments of a sumptuous barbaric art. One of the most impressive of these is the temple of El Deir, entirely hewn from the living rock, and the amphitheatre. See G. Dalman, *Petra und seine Felsheiligtümer*, 1909, and *Neue Petra-Forschungen*, 1912; A. B. W. Kennedy, *Petra, its History and Monuments*, 1925; and G. and E. Horsfield, *Sela-Petra*, 1935.

Petrarch, Francesco Petrarca (1304-74), It. poet and leader of the revival of learning, was the son of Ser Petracco Parenzo of Florence, a jurist and official of state. He was *b.* at Arezzo. In 1312 he went with his parents to Avignon, the seat of the papal court. He began to study law at Montpellier, and subsequently at Bologna, but the profession was repugnant to his poetic temperament, and to his passionate admiration for classical literature, in which Cicero and Virgil were his chief models. In 1326 he returned to Avignon and was ordained, but his interests and mode of life continued secular. In 1327 he for the first time saw Laura, who was the ideal love of his life. She died in 1348, and is only known by the sonnets (*Canzoniere*); who she was is wholly uncertain, and the early biographies never refer to her. She was the chief inspiration of P.'s sonnets, which were his greatest contribution to It. literature, and moulded the lyric poetry of the Renaissance. At Avignon he came under the protection of the Colonna family, whose service he entered. After 1333 he travelled widely but he soon sought the retirement he loved best at Vaucluse, near Avignon. Here he conceived the project of his poem, *Africa*, written in Lat., on the subject of Scipio Africanus. He wrote most of it in 1339. In 1340 he received invitations from the univ. of Paris and from the senate of Rome to accept the laurel crown of the poet. The coronation

of P. took place on the Capitol at Rome on April 8, 1311. He was the first to receive the honour of this revived rite on the Capitol. His latter years were spent at Milan, Venice, and finally Argua, near Padua. He had many benefices of which he enjoyed the income, and was the favoured correspondent of popes, kings (especially of Robert of Naples), and of statesmen, as well as the friend and correspondent of Boccaccio. The house at Arezzo in which he was born was regarded as a sacred place. He was anxious to bring about the return of the papal court from Avignon to Rome, and to restore Rom. independence.



PETRARCH

P.'s chief title to fame was his passion for the recovery of ant. literature, which he believed to have the power of restoring antique virtue, culture, and social order to a degraded age. He urged the rulers of his day to copy Camillus, Scipio, and the heroes of Rom. hist. He knew no Gk., his Lat. was stiff and showed little true scholarship, but he inspired the new feeling towards ant. studies and more than any one man determined the bent of the intelligence of the young towards ant. scholarship, his influence at Padua Univ. being remarkable. He warred against the medieval conception of life, especially against all terrifying superstitions, and against astrology. He died, leaving many illegitimate children, at Argua, a small tn. in the Euganean hills, where he is buried. His *Letters* (in Lat.) fill 5 vols. He wrote *De remediis utriusque fortune*; *De viris illustribus*; *Carmen Bucolicum*; *De contemptu mundi*; *Libri rerum memorandorum*. His lt. poetry, which greatly influenced Eng. and Fr. love poetry, consists of the sonnets, *Canzoniere*, or *Rime in vita e morte di Madonna Laura*, and the allegorical *Trionfi*, or *Triumphs of Love*,

Death, Chastity, etc. A complete ed. of P.'s works (*Edizione Nazionale*) is in course of pub. at Florence (first vols. pub. 1926). See F. de Sanctis, *Saggio critico sul Petrarca*, 1869; G. Korting, *Petrarcas. Leben und Werke*, 1878; P. de Nolhac, *Petrarque et l'humanisme*, 1892, 1907; M. F. Jerrold, *Francesco Petrarca*, 1909; E. H. R. Tatham, *F. Petrarca*, 1925; and N. Sapegno, *Il Trecento*, 1934.

Petrel (*Procellaria*), genus of oceanic birds, including the albatross, diving 's., flat-billed P.s., Shearwater P.s., and fulmar P.s., all of which have a hooked bill, rudimentary hinder toe, and tubular nostrils. The best-known member is the stormy P. or 'Mother Carey's chicken,' which is the smallest webbed-footed bird known. The plumage is smoky brown with a broad band of white above the tail. Marine insects and crustacea constitute the natural food, but the bird has acquired the habit of following ships to collect the fragments that fall. It is able to run lightly over the surface of the water with the aid of its wings, and this habit has given it the name of P. after St. Peter.

Petri, Olaus (1497-1552), Swedish reformer, b. in Orebro. From 1525, with his brother Laurentius, he laboured to spread Lutheran doctrines throughout Sweden. They also trans. the Bible into Swedish. From 1531 to 1533 P. was chancellor to Gustavus Vasa and preacher at Stockholm (1539). He was condemned to death (1540) for refusing to reveal a plot about which he had learnt through the confessional, but was pardoned and allowed to continue as pastor at Stockholm (1543). He left writings on religious subjects, a mystery play, and *Seonska Tronika* (see ed. of 1869). Strindberg treated his life dramatically. See also J. Schuck, *Olaus Petri*, 1894.

Petriciceiu-Hasdeu, Bogdan, see HASDEU.

Petrie, Sir William Matthew Flinders (1833-1912). Eng. archeologist, b. at Charlton, Kent, and educated privately. Archeological research led to his book *Stanhurst* (1880). In 1884-86 he carried out excavations at Naucratis and Daphne, proving Gk. settlement, and discovered middle kingdom papyri in the Fayum, 1888-90; but this was transcended in importance by the discoveries at El-Amarna in 1891 and at Nakadah in 1894. In the former he unearthed the palace of Akhenaten, and valuable frescoes. In connection with the Palestine Exploration Fund, he discovered and excavated at Lachish. In 1903-5 he discovered at Tell-el-Yehudiyeh the earthwork city of the Hyksos (Nile delta). P. shared with Prof. Reisner the honour of being the greatest of Egyptian excavators. No one in England has ever excited so much interest in Egyptology or introduced so many fresh workers into the field, e.g. the papyrologists, -nelli and Hunt. But he discounted the importance of philology, being himself no philologist, and it is this that gives an amateurish quality to his *History of Egypt* and some other works. He set new standards in archeology by his recognition of the importance

of pottery and by his personal supervision of his native assistants. It was not his good fortune to light upon such sensational discoveries as Carter's tomb of Tut-an-kh-Amen or Reisner's reburial of Queen Hetepheres. Cumulatively, however, his contribution was considerably greater and the variety of the objects found is almost incredible as the outcome of a single lifetime. P. estab. a tradition in the theory and practice of scientific excavation in Egypt, and the effect of the tradition is seen in archaeological work throughout the world. But to a wide public he was known for the new light his researches cast upon the study and interpretation of the Bible, and it is in those parts of the Bible which possess an Egyptian background that his contributions are likely to bear most fruit. P. belonged to the group of scholars who find traces of Egypt throughout the Pentateuch, as opposed to those who deny this. Apart from his attempt to make the Hyksos dominion of Egypt last for nearly 800 instead of 200 years, some of P.'s most interesting work is to be found in parallels which he draws between Egyptian and Heb. life. He was prof. of Egyptology at Univ. College, London, from 1892 to 1933, founded the Egyptian Research Account, and was knighted in 1925. His pub. works are *Inductive Metrology* (1875); *Pyramids and Temples of Gizeh* (1883); *Taunt's Portraits and a Season in Egypt* (1888); *Historical Studies and Hymns* (1889); *Ten Years' Digging* (1893); *Tell el-Amarna* (1896); *Religion and Conscience in Ancient Egypt and Syria and Egypt* (1898); *Royal Tombs of the Earliest Dynasties* (1901); *Abdus*, i (1902), ii (1903); *History of Egypt* (ed. 1903-5); *Researches in Sinai* (1906); *Eastern Exploration* (1919); *Prehistoric Egypt* (1920); *Descriptive Sociology of Ancient Egypt* (1926); *Hill Figures of England* (1926); *Geras* (1928); *Bethsheit* (1930); *Seventy Years in Archaeology* (1931, an autobiography); *Palestine and Israel* (1931); *Egyptian Architecture* (1938); and *Egyptian Science* (1939).

Petrifaction is produced by such minerals as calc-spar, silica, iron pyrites, and phosphate of lime, which, dissolved in water, have so acted upon some animal or plant as to penetrate every cavity of the structure. The result is a solid substance in which the most delicate parts are preserved often without signs of decay previous to or during the process. In some fossils the substance of the shell has been dissolved and a more durable mineral substituted, so that a perfect model is constructed.

Petrified Anemone, see (HOANITE).

Petrissage, see under MASSAGE.

Petrograd, name proclaimed by the tsar for St. Petersburg, 1914, and replaced by the name Leningrad (q.v.) in 1924.

Petrographic Province, term used in geology to denote a portion of the earth's crust within which the igneous rocks belong, to greater or less extent, to a definitely similar suite. There are two such provs., the calc-alkali and the alkali. The calc-alkali types include porphyritic,

gabbro, diorite, and other plutonic rocks, and basalt or other lavas; the alkali prov. yields such rocks as picrite, nepheline-gabbro and soda-granite. It is suggested by some geologists that calc-alkali rocks are characteristic of folded regions, while alkali rocks may be expected to occur in dists. subject to block-faulting. The plutonic igneous rocks of the Lewisian fundamental complex and those of the Old Red Sandstone age in Scotland are examples of calc-alkali provs., while the carboniferous igneous rocks of the Midland Valley of Scotland, Devon, and Cornwall belong to an alkali prov.

Petrography, see PETROLOGY.

Petrol (Gasoline, Motor Spirit), distillate of petroleum between the limits of about 70° and 100° C. with a flash point of about 60° F. and sp. gr. 0.73; it is very volatile, evaporating at ordinary temps. With air it forms an explosive mixture, and it has come into great use for internal combustion motors; it is also used for lamps and with incandescent mantles. It consists of paraffins chiefly, pentanes and hexanes, but may also contain aromatic hydrocarbons, olefines, sulphur compounds, and other impurities according to the petroleum used in its production. P. is obtained in general from the heavy oils by a process of 'cracking,' i.e. a chemical change involving heating under pressure (sometimes with a catalyst), which results in the decomposition of the crude material into bodies with lower molecular weights. The oil to be cracked may be vaporised first, or it may be treated in the liquid state. Sometimes the resulting P. is treated chemically with such reagents as sulphuric acid, caustic soda and sodium hypochlorite, and sodium plumbite to remove sulphur compounds, after which it is distilled again. Frequently other substances are added to P. Benzene is commonly used in this connection (up to as much as 10 per cent.). If benzene is used, it must be carefully runned, or trouble will arise in blocking up the parts of an engine by decomposition products. Many devices have been tried to prevent 'knocking' when P. is used in engines. It can be avoided by ensuring a lower compression ratio, but this is accompanied by loss of efficiency.

More usually a little tetraethyl lead (see ETHYL) is added to the fuel, as well as ethylene bromide, and a lubricant. The function of the ethylene bromide is to convert the lead into a more or less volatile compound. Another anti-knock reagent is iron carbonyl. In addition to boiling points of P., other important criteria are dewpoint, colour, smell, chemical composition. Aviation spirit contains low boiling-point fractions 40-70° C.

Petrol Rationing came into force in the United Kingdom at midnight of Sept. 22, 1939, but modifications were made soon afterwards to provide for the additional needs of doctors and taxi drivers. An order by the Mines Dept. was made about the same time prohibiting the use of kerosene or paraffin in any motor vehicle. In March 1942 the basic petrol ration for goods vehicles was abolished and petrol

issued at the discretion of the Regional Transport Commissioners. The basic ration for private motorists, having been gradually reduced between Feb. and June 1942, was abolished altogether on July 1, 1942, after which allowances were granted only in cases of genuine need. The basic petrol ration was restored in 1945 soon after the war in Europe ended. It was again abolished in 1947 for a few months, but restored soon afterwards on a reduced scale. After the ration was restored white petrol could only be used for private cars and red only for commercial vehicles and, generally, for mechanical plant. The Motor Spirit (Regulation) Act, 1948, provided that a garage proprietor convicted of having commercial petrol in a pump not marked 'commercial' might be disqualified from his business for twelve months, and the owner of a private car convicted of having commercial petrol in his tank disqualified for holding a driving licence for a year. In addition heavy fines or imprisonment might be imposed. The loss of petrol through the 'black market' was estimated (1948) at 100,000 tons a year.

Petroleum (Rock Oil) natural oil composed of hydrocarbons existing at various places in the earth's crust. The existence of P. has been known for many centuries but it is only within the last hundred years that its uses have been appreciated to any extent. It is now used with its various distillates as an illuminant, as fuel, and as a source of power in internal combustion, Diesel, and sev. other types of engines. It can be safely said that the aeroplane as it is known to-day and the fast road traffic of present times owe their development practically entirely to P. P. occurs in certain geological formations, but the best supplies are from carboniferous, Silurian, and from Tertiary formations, intermediate strata providing much loss. Various theories as to the genesis of P. have been advanced such as (a) by the action of steam on carbides, (b) by the decomposition of the fatty parts of marine organisms under high temps. and pressures. This latter theory is supported by the fact that most Ps. are optically active, a fact which indicates their derivation from organic matter which shows optical activity. In some places P. is found at the earth's surface in the form of seepages, in others it is found trapped at greater or lesser depths in rocky formations. In the places where these seepages occurred, the P. was collected in very early days by the local inhab. for domestic use. It has been suggested that the burning fiery furnace into which Shadrach, Meshach, and Abed-nego were cast by Nebuchadnezzar was nothing more than a seepage that had become ignited. In cases where the P. has become trapped below the earth's surface, wells (see OIL WELLS) are sunk. There are indications that there were hand-dug wells in Burma in the thirteenth century. The P. recovered from these wells was not refined and its prin. use was for preserving the wood of houses and boats.

The method employed at the present day for recovery from underground reservoirs is drilling. The first well drilled by other than hand power was drilled by Edwin Drake in Pennsylvania in 1859, using a steam engine. Originally the percussion method of drilling was used almost exclusively, but this system has now been practically entirely superseded by the rotary method. Sometimes when the underground reservoir is tapped, the P. comes up under great pressure and in the early days of oil-well drilling, oil was forced into the air for a considerable height, this type of well being known as a 'gusher.' Nowadays the flow from all wells is practically always controlled. Usually the P. is pumped to the surface and then conducted through pipes (often hundreds of in. long) to the site where distillation and refining is to be carried out. Crude P. is dark brown or yellow, fluorescent and offensively odorous. From the chemical standpoint Ps. may contain hydrocarbons of four types—namely paraffins, naphthenes (such as cyclopentane), aromatic bodies, and unsaturated hydrocarbons. In addition to any or all of these there may be present pyridine, quinoline, phenols, resins, mercaptans, asphaltic bodies, and so on. According to the predominant hydrocarbons a P. may be paraffinic, naphthenic, aromatic, asphaltic, etc. Amer. P. is mainly paraffinic with only small traces of nitrogen and sulphur compounds. P. from Baku is of the naphthenic type and yields excellent lubricants. Rumanian P. contains a good deal of aromatic material, as does P. from Borneo, whilst Persian P. is characterised by being fluorescent, and is intermediate between paraffinic and naphthenic composition. Important factors in the description of a P. are density, viscosity, surface tension, specific heat, vapour pressure, flash point, colour, refractive index, optical activity, and heat of combustion. The crude oil is subjected to fractional distillation and refining.

Modern distillation and refining (see the article below, PETROLEUM REFINING) processes are extremely complicated, requiring very expensive plant. At various stages the processes are carried out under pressure or in a vacuum. The distillate is sometimes agitated by currents of air blown in with sulphuric acid and caustic soda to purify colour and odour, sulphur, tarry matter, and other impurities. Among the products of distillation are cymogene and chigolene with low flash points used in freezing machines, etc.; gasoline, boiling at 115° F. for vapour lamps and fuel for internal combustion engines; kerosenes, the illuminant. The residuum is further treated for heavy lubricating oils, vaseline, and wax. In the case of Great Britain only those oils with flash point of 73° F. or upwards may be used as illuminants. As a fuel for motors and engines of the internal combustion type the products of P. have enormously increased and much is being done to render the use of the less refined oils practicable. It is being used

for locomotives and cargo vessels and in the navy. Not only is it of greater calorific value but there is less loss in practice than with coal and it implies less labour in many ways, e.g. the process of 'coaling' ships would be less troublesome. Amer. P. was first discovered in Pennsylvania, many other localities having given rise to it since, e.g. California, Texas, Ohio, Kansas, Illinois, etc., whilst a good deal has been obtained from Mexico. Russian P. has been known for a very long time, the region round Baku being noted in particular for its supply of P. P. is also found in considerable quantity in parts of Rumania, Poland, Africa, Dutch E. Indies, Japan, Iran, and Canada. In the last decade or so new important countries have entered the P.-producing field, notably Bahrain, Iraq, Kuwait, and Saudi Arabia. Small quantities are obtained in Scotland by the distillation of a bituminous shale (see SHALE OIL) which occurs there. The total world output of crude P. in 1948 was approximately 451,171,000 tons made up as follows:

U.S.A.	297,190,000 tons
Venezuela	70,116,000 "
U.S.S.R.	30,500,000 "
Iran	25,268,000 "
Saudi Arabia	19,260,000 "
Mexico	8,376,000 "
Kuwait	6,400,000 "
Rumania	4,500,000 "
Colombia	3,408,000 "
Iraq	3,153,000 "
Argentina	3,000,000 "

From 1938 to 1948 production fell in the following countries as under.

	1938	1948
Netherlands		
E. Indies	7,400,000	4,410,000
India and Burma	1,200,000	200,000
Rumania	6,900,000	4,500,000

In the case of the first two areas where production in 1948 was below that for 1938, this is due to the main producing wells having been put out of action during the Second World War. Production in Netherlands E. Indies increased from 1,000,000 tons in 1947 to 4,410,000 in 1948. See also ASPHALT; 'FLASH POINT'; PETROL. See R. N. Boyd, *Petroleum, its Development and Uses*, 1895; H. Neuburger and H. Notholt, *Technology of Petroleum* (trans.), 1901; B. Redwood, *Petroleum and its Products*, 1906; A. B. Thompson, *Petroleum Mining and Oil Field Development*, 1910; Shell Petroleum Company Ltd., *The Petroleum Handbook*, 1931, 1948 (private circulation); W. H. Emmons, *The Geology of Petroleum*, 1931; L. Gurwitsch and H. Moore, *The Scientific Principles of Petroleum Technology*, 1932; and C. Webber *The Story of Petroleum*, 1934.

Petroleum Acts. The Petroleum Acts of 1871 and 1879 relate to the grant of licences to keep petroleum. Petroleum (i.e. any rock oil, Bangpon oil, Burma oil, oil made from petroleum, coal, schist, slate, peat, or other bituminous products) which on test gives off an inflammable

vapour at a temp. of less than 73° F. may not be kept without a licence unless kept in separate securely stoppered glass, earthenware, or metal vessels, containing not more than one pint each, to an aggregate quantity not exceeding three gallons. The licensing authorities are the dist. and bor. councils. The regulations of July 1907 exempt from licence petroleum spirit kept for or used on light locomotives; but such spirit must be kept or used in conformity with the regulations. In no case is petroleum kept for sale exempt from licence under the Acts. No person other than one acting on behalf of the Crown or one holding a licence may search or bore for petroleum within the United Kingdom. Provisions for regulating boring or searching for oil are made in the Petroleum (Production) Act, 1918. Under the Petroleum Spirit (Conveyance) Regulations, 1926, the secretary of state may make regulations as to the conveyance of petroleum spirit by road and for protecting persons or property from danger in connection with such conveyance (see Statutory Rules and Orders, 1926, No. 1310, and also other regulations, 1929-32.) A number of miscellaneous powers are conferred and duties imposed by the Petroleum (Consolidation) Act, 1928: notice of ships carrying petroleum spirit must be given on entering harbour and the harbour authorities must make by-laws in respect of ships carrying spirit into harbours; the Act also provides for by-laws as to petroleum-filling stations, regulating their appearance, position, design, size, and colour. It provides for regulating classes of spirit likely to be dangerous or injurious to health; empowers gov. inspectors to ensure compliance with the Act and the issue of warrants to search for and seize petroleum spirit. Exemptions from the provisions of the Act are specified in the case of the keeping and use of petroleum spirit for motor vehicles, motor boats, aircraft, and certain classes of engines. There are provisions in the Ministry of Fuel and Power Act, 1945, on the functions of the minister for securing the effective and co-ordinated development of petroleum (as of other minerals).

Petroleum Refining. There are very many different types of crude oil and methods of handling them vary considerably. Therefore all that is given is an outline of the usual practice and the principles generally followed. The process of treating crude petroleum is always one of fractional distillation with subsequent chemical treatment, filtering, redistillation, and compounding of each of the fractions. The crude is introduced into stills and then heated. At various temps, vapours from the different components are drawn off and condensed, the more volatile first. The components of petroleum boil at different temps., but when the boiling-point of the first is reached the vapour will contain some of the less volatile components. Therefore a system of continuous rectification is employed whereby evaporation is effected in many successive stages and the residue

of each stage is returned to the preceding one. This results finally in the crude being split into two fractions, one containing all the low-boiling-point components, the other all the high. The heaviest fractions of crude oil would require such high temps. to evaporate that that 'cracking' (decomposition by heat) would occur. In order to avoid this distillation is carried out under vacuum, the boiling-point thus being lowered. For the very lightest fractions condensation of the vapours cannot be obtained at atmospheric pressure, so distillation is carried out under pressure which increases the boiling-point and consequently the temp. at which condensation can be obtained. Steam distillation, i.e. the injecting of steam into the oil in a still, is applied just like vacuum distillation for the higher boiling-point components, and also often in combination with vacuum distillation.

About 1912 the fractional condensation system was adopted. Under this system the oil is heated up to the highest temp. necessary to drive off all the distillate, and is then cooled down gradually so that the successively cooled fractions are lighter and lighter. The heating is carried out in a 'pipe still,' i.e. a series of tubes about 4 in. in diameter, connected together, so that the oil travels back and forth over the fire until it reaches the required temp. The heated oil, on leaving the pipe still, passes to the fractionating columns where the separation into fractions or 'cuts' takes place. These columns are long cylindrical vessels set up on end and fitted with a large number of trays of a special type.

The cracking process plays an important part in modern P. R. Cracking is a high temp. treatment which breaks up heavier or larger hydrocarbon molecules into smaller ones, often at the same time altering their internal structure. This enables a much higher gasoline yield to be obtained from the crude. Among the better known liquid phase cracking methods are the Dubs process, Holmes-Mansley process, tube and tank process and the Cross process. The unrefined gasoline obtained requires elaborate refining before it can safely be used as motor spirit. The distillate is again distilled to obtain the following fractions: (1) a light gasoline distilling up to about 100° C., (2) a heavy gasoline distilling about 100–200° C., and (3) a gas oil fraction. The last is separated mainly with a view to economising in chemicals. The light gasoline is treated with a concentrated caustic soda solution to draw off the so-called mercaptans (sulphur compounds of relatively simple composition with a very bad odour). The heavy gasoline is treated with sulphuric acid in the same way. The fractions are also treated with other chemicals and eventually the light and heavy fractions are recombined and ready for use.

The refining of kerosene is carried out in practically the same way as that of gasoline, sulphuric acid and caustic soda again being used for the purpose. Lubricating oil is refined chiefly to obtain a

good colour and to keep the colour stable during long periods of storage. Here again sulphuric acid is used, but in order that the lubricating oil may mix thoroughly with the acid and the acid tar settle out readily, it is usual to reduce the viscosity of the oil by warming it.

Many other oils, fuels, and by-products are derived by a variety of methods.

Petrology, Petrography, or Lithology, science or study of the rocks is concerned with their chemical and mineralogical composition, their macroscopic and microscopic structure and their systematic classification. In the field the geologist can determine something of the external characters of a rock by means of a knife, a pocket lens and a little acid. In the laboratory, by means of sp. gr. determinations and the use of the blowpipe, the value of metallic rocks can be quickly estimated. By chemical analysis a more exact estimation of the composition of the rock can be made, and from a knowledge of its bulk composition it can be suitably classified. The examination of thin slices of rocks under the microscope is one of the most important of petrographic methods. Rock sections can be made which are less than $\frac{1}{8}$ of an inch thick. Mounted on thin glass slides (with a medium such as Canada balsam), these rock sections are examined under a microscope fitted with polarising and analysing prisms. The mineralogical constitution of the rock can then be determined, the constituent minerals being distinguished by their appearance under ordinary and polarised light, their refractive index, pleochroism, birefringence and crystalline form, etc. As well as observing the minerals of the rock in their microscopic sections, by the use of liquids of varying densities, the minerals can be separated and obtained pure from the crushed rock. This method is dependent on the characteristic sp. grs. of the various minerals.

The rocks of the earth's crust are classified as sedimentary, igneous and metamorphic. The first type are rocks which have been formed more or less exclusively, under water, by the accumulation of detritus and fragmental volcanic material by organic agency or by chemical action and the evaporation of saline solutions. This last includes the secondary cementing of fragmental rocks and the deposits of rock salt, gypsum, etc. As a group the sedimentary rocks show a stratified bedded or laminated appearance, and except in some calcareous rocks, a fragmental or 'clastic' structure. It is in these rocks too that fossil remains are to be found. These stratified rocks are treated petrologically under four groups: (1) 'coarser detrital deposits' ('arenaceous') forming sandstones, quartzites, etc. (2) The finer detrital deposits or 'argillaceous' rocks (clay, slate, marl, etc.). (3) The 'calcareous rocks' consisting of carbonate of lime (limestone). (4) 'Pyroclastic' rocks, consisting of fragmental volcanic material (tuffs and ballustras). Coal, peat, and lignite are of organic origin.

Igneous rocks, formed by the consolidation of molten magmas, are generally vitreous or crystalline, and differ from one another in character, according to the composition of the magma and to the conditions of consolidation. The composition of the rock is indicated by the essential minerals, although, under different conditions of solidification, magmas of similar composition may give rise to different mineral aggregates. In any genetic classification, however, the essential minerals necessarily are important. According to their structural features, dependent on the condition of consolidation, the massive igneous rocks are divided into three groups: volcanic, hypabyssal, and plutonic. Further they are classified as acid, intermediate, and basic according to their percentage of silica, acid rocks containing 65 to 80 per cent, intermediate 55 to 65 per cent, and basic 45 to 55 per cent.

Plutonic rocks are essentially coarse grained, and have originated during high pressure and slow cooling of the original magma. Included here are granites, which contain essentially quartz, acid feldspar (e.g. orthoclase), and mica, together with other accessory minerals like sphene, apatite, etc. Syenites contain little or no quartz. Diorites consist of soda-lime feldspar and hornblende, with accessory minerals. Gabbros, norites, and peridotites are more basic in type. Hypabyssal rocks include dyke rocks such as granophyres (acid), porphyries, phryrites, dolerites, and lamprophyres. Volcanic rocks are mainly of the lava type, the essential point being that solidification has taken place by quick cooling under low pressures. They are often glassy. Included here are rhyolites (acid), trachytes, phonolites, andesites, basalts (basic).

Metamorphic rocks are those which are formed from the alteration of existing rocks (which may be sedimentary or igneous) by percolating waters, or by heat and pressure. They are classified under (a) thermal metamorphism, where temperature alterations have caused metamorphism, e.g. schists, gneisses, chloritoid slate, marbles, etc.; (b) dynamic metamorphism, where intense pressures have been at work, e.g. many gneisses and schists, phyllites, amphibolites, etc. They often show a banded or foliated appearance, are generally crystalline, and show typical structures, etc. Thus 'Augen structure,' strained crystals, and cataclastic structure are characteristic. By the alteration of the rocks, new minerals are formed (see METAMORPHISM).

See also FUGURITE. See F. H. Hatch, *Textbook of Petrology*, 1902; A. Holmes, *Petrographical Methods and Calculations*, 1921; N. L. Bowen, *The Evolution of the Igneous Rocks*, 1928; F. F. Grout, *Petrography and Petrology*, 1932; P. G. H. Boswell, *On the Mineralogy of Sedimentary Rocks*, 1933; F. H. Hatch, and A. K. Wells, *Petrology of the Igneous Rocks*, 1937; F. H. Hatch and R. H. Rastall, *Petrology of the Sedimentary Rocks*, 1938; and W. H. Twenhofel and

S. A. Tyler, *Methods of Study of Sediments*, 1941.

Petromyzon, see LAMPREY.

Petronel, see PISTOL.

Petronius, Gaius, one of the chosen companions of Nero, and regarded as director-in-chief of the imperial pleasures (*Eligantissimus arbiter*). The influence which P. thus acquired excited the jealousy of Tigellinus, and being accused of treason he put an end to his life by opening his veins (Tacitus, *Annals*, xvi. 18, 19). He is said to have dispatched in his last moments a letter to the prince, taunting him with his brutal excesses. It is generally agreed that he is the author of the work, portions of which have come down to us, bearing the title *Petronii Arbitri Satyricon*. It is a sort of comic romance, often licentious, but frequently keen in its satire. The most complete fragment we possess is the celebrated *Cena Trimalchionis*. Best ed. is that by W. D. Lowe (1905), with useful notes and a trans. in Eng. prose. There is also a text and trans. by M. Heseltine, 1913.

Petropavlovsk: 1. Tn. in the N. Kazakhstan Region of the Kazakh S.S.R., on the Trans-Siberian Railway, 170 mi. W. of Omsk, has a large trade in cattle and cattle produce with Bokhara. Pop. 47,000. 2. Tn. on the E. coast of Kamchatka.

Petropolis, tn. and summer cap. of Rio de Janeiro, Brazil, in the beautiful Serra da Estrella, 28 mi. N. of Rio de Janeiro. It was the cap. of the state from 1894 to 1903. It manufs. silk, cotton goods, and cigars. The new hotel Quitandinha is the most expensive ever built. An Inter-Am. defence conference was held in P. in 1917. Pop. 46,800.

Petrovgrad, formerly Veliki Bečkerek, tn. of the Banat, Yugoslavia, founded in 1724. It lies on the Bega Canal and has vine and silk-worm culture. Pop. 32,800.

Petrovic Niegos, see DANILO I.

Petrovsk, see MAKHACH-KALA.

Petrozavodsk, cap. of the Karelo-Finnish S.S.R., and a port on the W. shore of Lake Onega, 190 mi. N.E. of Leningrad. It has paper mills, iron mines, steel and mica works, a gov. cannon foundry and powder factory, tanneries, and brick works, and a trade in timber, corn, and fur. There is a univ. Pop. 69,700.

Petrus Damiani, Saint, see DAMIANI.

Petrus de Vineis, see VIGNA, PIER DELLA.

Petrus Lombardus, see LOMBARD, PETER.

Petsamo, or Pechenga: 1. Prov. of Finland, bounded on the N. by the Varanger Fjord, on the E. by Russia. Pop. 2100. 2. Port of the Murmansk Region of the R.S.F.S.R. This tn. and Pikkajärvi, to the S.W., were the scene of fighting in the Finnish-Russian war 1939-40, and both were occupied by Soviet troops. The fleet air arm, co-operating with the Russians, first raided P. in July 1941. The tn., which became part of Finland in 1920, was ceded to Russia in 1945. Pop. 1700.

Petticoat Lane, old name for Middlesex Street, in the E. of London. Running N. from Whitechapel High Street, Bishopsgate, it was the centre of a seventeenth-century colony of Fr. weavers. In later

years it became a Jewish quarter, noted for its Sunday morning open-air market for second-hand clothing. The old name was discontinued in about 1830.

Pettie, John (1839-93), Brit. painter, *b.* at E. Linton, Haddingtonshire. He shared a studio with Orchardson for a time, and was elected R.A. in 1873. His colour schemes are effective and his figures well handled. His works include 'The Drumhead Court-martial' (1865); 'The Body Guard,' 'An Arrest for Witchcraft' (1866); 'A Challenge,' 'A Death Warrant' (1879); 'The Vigil' (1884); 'The Chieftain's Candlesticks' (1896); 'Two Strings to her Bow' (1887). *See* life by M. Hardie, 1908.

Petty, Sir William (1623-87), Eng. statistician and political economist, *b.* at Romsey, Hampshire. He studied at the Jesuit College, Caen, and then returned to England and entered the R.N. In 1649 he took his medical degree at Oxford, and in 1652 became physician-general to the army in Ireland. After the Restoration he gained the confidence of Charles II., devoted his time to statistical studies, and became one of the founders of the Royal Society. He pub. *Reflections upon some Persons and Things in Ireland* (1660); *A Treatise of Taxes and Contributions* (1662); *An Essay concerning the Multiplication of Mankind* (1682); *Political Arithmetick* (1690); and *The Political Anatomy of Ireland* (1691). A collected ed., *The Economic Writings of Sir William Petty*, ed. by C. H. Hall, was pub. in 1899. *See* life by Lord E. Fitzmaurice, 1895, and M. Pasquier, *Sir William Petty: ses idées économiques*, 1913; also C. H. Hall (ed.), *Economic Writings of Sir W. Petty*, 1899; and Marquess of Lansdowne (ed.), *Correspondence*, 1928.

Petty, William, *see* LANSDOWNE, MARQUESS OF.

Petty Bag Office, defunct office of the old court of chancery (*see* CHANCERY), the clerk of which had the duties of drafting parl. writs of *scire facias* (q.v.), *compes d'elire* for bishops, and, indeed, all original writs passing under the great seal and commissions of sewers, lunacy, and the like. Some of these writs, says Stephen, were originally kept in a *hamper* (whence the name 'hamper office') in contradistinction to those which were kept in a little sack or bag (whence the name P. B. O.); the hamper contained writs and returns relating to the business of the subject, while the bag contained those in which the crown was mediatly or immediately concerned. All the duties formerly belonging to the clerk of the P. B. O. with respect to writs and letters patent are now, by the Great Seal Offices Act, 1874, vested in an official called the clerk of the crown in chancery or his officers; while the other duties appertaining to that office, e.g. enrolment, sealing, and issuing of documents and writs, and other matters relating purely to the administration of justice, are now performed by the senior clerk of the crown office dept. of the central office of the high court. *See* Halsbury's *Laws of England*.

Petty-Fitzmaurice, Henry Charles Keith, and William, *see* LANSDOWNE, MARQUESS OF.

Petty Officers in the R.N. are analogous to the non-commissioned officers in the army, a chief petty officer ranking with a sergeant-major and a petty officer with a sergeant. In the executive and engineering branches they rise through the ranks by merit and examination, and are responsible to their superior officers for the proper care of sev. portions of the ship, of groups of men and machinery. All artisan ratings automatically acquire the rate of petty officer as soon as they are qualified in their particular sphere.

Petty Sessions, *see* SESSIONS OF THE PEACE.

Petunia (from *petun*, a native S. Amer. name for tobacco, to which plant the P. is allied), genus of ann. or perennial plants (family Solanaceae), with attractive funnel-shaped flowers of a great variety of colours. They are specially valuable in hot, dry beds and borders.

Petworth (anct. *Peteorde*), par. of Sussex, England, 9½ m. W.N.W. of Arundel. P. House, associated with the families of Percy, Seymour, and Wyndham, was rebuilt between 1686 and 1696; it has one of the best private collections of pictures in England, including twenty of Van Dyck's portraits, and some excellent carving by Grinling Gibbons. In 1947 it was acquired by the National Trust from the third Lord Leconfield. Pop. (1931) 2,500.

Petulls, *see* FULAMS.

Peutinger Map, medieval copy of a Rom. road map made in the latter half of the fourth century A.D., which was in the library of Conrad Peutingger, a scholar and antiquary of Augsburg, upon his death in 1547. It is now in the National Library, Vienna. The map, which is more strictly a diagram of road routes, covers the Rom. Empire from Spain and Britain in the W. to India in the E. The Brit. portion is largely incomplete, but it is important as the earliest known map of Rom. Britain. It is thought that the map was brought to Europe from a monastery in Jerusalem, and that it was copied from the original in the thirteenth century.

Pevensey, par. and vil., Sussex, England, on the coast, 6 m. N.N.E. of Eastbourne, has the extensive remains of the Rom. Anderida, a fort of the Saxon shore built in the second half of the third century and garrisoned until the end of the fourth. P. was the landing place of William the Conqueror, 1066, and a Norman castle, still existing, was built in the E. end of the Rom. fort. It enters the hist. of the Cinque Ports as a corporate member of Hastings. Pop. 500.

Pevevil, or Peak, Castle, *see* under CASTLETON.

Pews, enclosed seats in churches. Church seats were in use in England some time before the Reformation, as is proved by records as old as 1450 speaking of such seats by the name of *pews*. They were originally plain fixed benches, all facing E., with partitions of wainscoting about 3 ft. high, and sides of the width of the seat, panelled or carved, the sides some-

times rising above the wainscoting and ending in finials or poppies, or else ranging with it and finished with a moulding. After the Reformation, probably under the influence of the Puritans, who, objecting to some parts of the service which they were compelled to attend, sought means to conceal their nonconformity, P. grew into large and high enclosures, containing two or four seats, lined with baize, and fitted with doors, desks, and cushions. By the law of P. in England, all church seats are at the disposal of the bishop. It appears that by common law every parishioner has a right to a seat in the church, and the churchwardens are bound to place each one as best they can. The retention of family P. ended shortly after 1850, and the renting of P. has now become less common.

Pewsey, tn. of Wiltshire, England, 6½ m. by road S. of Marlborough; it is an agric. centre. Pop. 2,000.

Pewter, alloy of lead and tin formerly used for making drinking vessels, plates, etc. According to law it must not contain any free lead (to avoid lead poisoning), which is easily soluble in acid liquors. The eutectic proportion of tin is therefore the minimum, i.e. 67 per cent. In France vessels containing over 18 per cent of lead may be confiscated. See M. Bell, *Old Pewter*, 1906; C. A. Markham, *Pewter Marks and Old Pewter Ware*, 1909; H. J. L. Masse, *Pewter Plate* (2nd ed.), 1910; H. Jenkins, *The Pewter Collector*, 1921; and H. H. Cotterell, *Old Pewter: its Makers and Marks*, 1929.

Pezza, Michele, see DIAVOLO.

Pfalz, see PALATINATE.

Pfalzburg, see PHALSBURG.

Pfennig, Ger. coin, since 1871, representing the one-hundredth part of a mark. Before the First World War one and two-P. copper coins were current; in 1915 iron pieces of 5 and 10 Ps. were issued; in 1916 aluminium pieces of 1 and 50 Ps. were coined, and later even zinc coins of 10 Ps. Thereafter nickel coins were issued.

Pfleiderer, Otto (1833-1908), Ger. theologian of the new school and exponent of modern Protestant N.T. criticism in Germany, b. at Stetten, near Cannstadt, P. studied at Tübingen. He occupied the chair of theology at the univ. of Jena in 1870, and at Berlin from 1875. His *Christian Origins*, pub. in London in 1906, contains some of his last philosophical ideas and exegesis. Another well-known work of his is *The Development of Theology in Germany since Kant, and its Progress in Great Britain since 1825* (trans. 1890). See life by P. Gastrow, 1913.

Plorzhelm, tn. of Württemberg-Baden, Germany, on the N. border of the Black Forest, 16 m. S.E. of Karlsruhe. Situated on the R. Enz, its manufs. include clocks, cheap jewellery, chemicals, iron goods, paper, and leather. Pop. 78,700.

Phæaciæans, or **Phæacians** (Gk. Φαίακες, or Φαίηες), mythical people mentioned in Homer's *Odyssey*, vi.-viii., as dwelling on the is. of Scheria (Corcyra or Corfu). They were visited by Odysseus on his return from Troy to Ithaca. The Cyclopes were supposed to have driven them from

Hyperia, their first home. Alcinoüs, father of Nausicaa, was their ruler at the time of Odysseus's visit. They lived a life of undisturbed happiness and peace, and possessed wonderful ships that needed no human guidance. See A. C. Merriam, *Phæaciæans of Homer*, 1880.

Phædon, or **Phædo** (Gk. Φαίδων), Gk. philosopher of the fourth century B.C., a disciple of Socrates. Taken to Athens as a prisoner of war (c. 400 B.C.), he became intimate with Socrates, who procured his release. He was present at the death of Socrates, as related in Plato's famous dialogue called by his name. After this he returned to Elys and founded the Elysian school, later merged in the Eretrian.

Phædra (Gk. Φαίdra), in Gk. legend, daughter of Minos and Pasiphaë, wife of Theseus. She fell in love with her stepson, Hippolytus, and when repulsed by him accused him to Theseus of attempting to dishonour her. Theseus called on Poseidon to destroy Hippolytus. The god accordingly sent a monster from the sea which terrified the horses of Hippolytus who was dragged along in his chariot and killed by the seashore. The truth became known after his death, and P. slew herself. Euripides' *Hippolytus*, Seneca's *Phædra*, and Racine's *Phèdre* are plays dealing with the subject.

Phædrus (Gk. Φαίδρος), Rom. fabulist of the first century after Christ, originally a Macedonian slave, perhaps liberated by Augustus. Under Tiberius he suffered from the hostility of Sejanus, but lived to see his overthrow (A.D. 31), and probably d. in Claudius' reign. The *Fabulæ Æsopæ* in iambic verse ascribed to him were first pub. by Pithagoræ (1596). Later eds. were those of Bentley (1726), Orrelli (1831), Müller (1877, 1890), Schmitz and Ramavino (1884), and J. P. Postgate, 1919. See L. Hervieux, *Les Fabulistes latins*, 1884, 1893-96, and J. Bédier, *Les Fabliaux*, 1893.

Phædrus (Gk. Φαίδρος), Athenian of the fourth century B.C. He was a friend of Plato, one of the most famous dialogues being named after him. It is a discourse between Socrates and P., full of poetic beauty and enthusiasm.

Phæstus (Gk. Φαίστος), unet. Cretan city 2½ m. S.W. of Candia. From 1900 excavations have revealed a magnificent palace, with a smaller one at Hagia Triada 2 m. distant.

Phæthôn (Gk. Φαέθων, the shining), in the Gk. poets, often an epithet of Helios, the sun god. More usually the name of a son of Helios and Clymene. To prove his descent and gratify his ambition he persuaded his father to allow him for one day to drive the chariot of the sun, but failing to control the fiery horses came too near the earth. Zeus killed him with a thunderbolt and hurled him into the Eridanum (Po.). See G. Knaack, *Quæstiones Phæthonicæ*, 1885, and Bangert, *De Fabula Phæthonicæ*, 1885.

Phæton, most commonly an open four-wheeled carriage drawn by one or two horses; there are varieties known as pony, mail, and spider P's.

Phagocytosis (Gk. φαγειν, to devour; κυτος

cell) is the process of ingestion of undesirable material by certain cells, the phagocytes. In the higher animals the majority of these cells are the white corpuscles, or leucocytes, in the blood. They resemble amoebæ in their mode of movement and in their ability to ingest and digest many kinds of bacteria. On this account Metchnikov introduced the theory of P. to explain immunity to disease. If the germs were rapidly ingested, disease might be prevented, and animals with active phagocytes would thus be naturally immune. If ingestion were slow, the disease would run its course, but might eventually be combated by P. Metchnikov distinguished two kinds of phagocytes, the small ones in the blood, and the larger ones in blood and in certain tissues such as endothelial cells and connective tissue. As a result of the research activated by his theory, phagocytes are now distinguished according to their function. Some ingest parasites; others flock to the surface of exposed wounds and help to form a protective covering; others force their way through the walls of capillaries in injured tissues, remove dead tissue and injurious bacteria, and form the pus sometimes accompanying inflammation. Other phagocytes secrete products that kill the bacteria, while yet others may resorb the tissues of tumours, cysts, and of grafts. P. has been recognised in many animals. It was first observed by Metchnikov in the larvae of starfish and in the common water ' flea' (Daphnia). During metamorphosis the cells of tails of tadpoles first undergo differentiation and are then removed by P. In sponges phagocytes ingest obstructing and injurious particles and eject them into the water currents.

Phalacrocorax, large, web-footed bird. See CORMORANT.

Phalanger, see CUSCUM.

Phalanx, name given to the formation of the heavy infantry of the anc. Grecian armies. It consisted of a series of parallel columns of men standing close one behind the other, and capable of penetrating and resisting almost any other formation. The Spartan P. was the original of this formation and consisted of soldiers standing from four to eight men deep. The Macedonian P., the last of this formation, was sixteen men deep. The soldiers were armed with swords and spears, usually long pikes. They were flanked by *pelustæ* and infantry. The Romans defeated the P. by a combination of missile attacks and harassing tactics.

Phalaris (Gk. *Φάλαρις*) (c. 570-549 B.C.), tyrant of Agriguntum (Agrigento), Sicily, maintained his position with the aid of mercenaries. The tradition of his roasting people alive in a brazen bull is as old as Pindar. He was deposed by Telemachus, ancestor of Theron. Bentley proved the *Lettera* ascribed to P. to be forgeries. See H. Bentley, *Dissertation* 1699 (new ed. 1817); E. A. Freeman, *History of Sicily*, 1891; Suidas, *Phalaris*; and Cicero, *De Officiis*, II., III.

Phalarope (*Phalaropus*), genus of birds which includes two species that some-

times occur in Britain. The red-necked P. (*P. hyperboreus*) breeds mostly in polar regions, and also in the Orkneys, Shetlands, Hebrides, and W. of Ireland. It is about the size of a sandpiper, and its winter plumage is leaden grey and white, ruddy patches appearing on the neck in summer. The grey P. (*P. fulicarius*) is rather larger.

Phalerum (Gk. *Φάληρον*), in anct. geography, a seaport of Attica, Greece, the port of Athens up to c. 475 B.C., when the Piræus (q.v.) to the W. replaced it. It is on a bay 3½ m. S. of Athens, now frequented as a bathing-place.

Phallus, representation of the male generative organ, used at certain Dionysiac festivals in anct. Greece, as a symbol of the powers of procreation. It was an object of common worship throughout the nature-religion of the E., and was called manifold names, such as Linga, Joni, Polleus, etc. Originally it had no other meaning than the allegorical one of that mysterious union between the male and female, but at a later and decadent period its worship became an intolerable nuisance, and was put down by the senate on account of the more than usual immorality to which it gave rise. The Phœnicians traced its introduction into their worship to Adonis, the Egyptians to Osiris, the Phrygians to Attys, the Gks. to Dionysus. The common myth concerning it was the story of some god deprived of his powers of generation, an allusion to the sun, which in autumn loses its fruit-tying influence. The procession in which it was carried about by Phallophoroi was called Phallagogia, or Periphallia, and a certain hymn was sung on that occasion called the *Phallickon Melos*. Aristotle traces the origin of comedy to the ribaldry and the improvised jokes customary at those festivals. Before the temple of Venus at Hierapolis there stood two phalli, 180 ft. high, upon which a priest mounted annually and remained there in prayer for seven days. The P. was an attribute of Pan, Priapus, and to a certain extent also of Hermes.

Phalsbourg (Ger. *Phalsburg*), tn. of the dept. of Moselle, France, 25 m. W.N.W. of Strasburg. It was originally a strong fortress. Pop. 2600.

Phaltan, tn. and cap. of the state of P., Bombay, India, 50 m. S.S.E. of Poona. Pop. 11,000. The state has an area of 39 sq. m. Pop. 71,500.

Phanerogamia, or Flowering Plants, one of the two great divs. of the vegetable kingdom. They have evident flowers with stamens and pistil and usually a perianth; they reproduce themselves by seeds which contain an embryo. Those that have the seeds enclosed in an ovary are Angiosperms and the others Gymnosperms.

Pharaoh, Anct. Heb. form of the ordinary title of an Egyptian king.

Pharisees (Heb. *פָּרִישִׁי*, separated; Gk. *Φαρισαῖοι*), religious party among the Jews, first achieving prominence during the latter half of the second century B.C., in the time of John Hyrcanus. They were opposed to the secularising of the

high-priesthood, which had so long been increasing, and were characterised by the stress they laid upon the eternal, permanent, and unchanging nature of the law, and upon the separation between Israel and the Gentile races. They did much service to their people by their uncompromising patriotism and by their opposition to the liberal opinions of the Sadducees; but they rapidly became the slaves of formalism, and their very servitude rendered them overweening in their pride as the only observers of the law. See E. Schurer, *History of the Jewish People in the Time of Jesus Christ*, 1886-1890.

Pharmaceutical Society, Brit. society, which was founded in 1841 to protect the interests of chemist- and druggists and to increase their usefulness to the community. In 1843 a Royal Charter of Incorporation was granted which set out the four objects of the society as being the advancement of chem. and pharmacy, the promotion of a uniform system of education, the protection of those carrying on the business of chemists and druggists, and the provision of a fund or funds for benevolent purposes. Up to the end of 1933 the society was a voluntary association with membership restricted to registered pharmaceutical chemists and chemists and druggists. With the passage of the Pharmacy and Poisons Act, 1933, however, the voluntary nature of the society ended and every person who passes the appropriate examination and becomes registered in one or other of the above classes automatically is a member of the society. The present membership is nearly 26,000. Under the Pharmacy Acts of 1852 and 1868 the P. S. conducts examinations, registers successful candidates, and by the Pharmacy and Poisons Act of 1852 to 1933 institutes proceedings when the law is contravened. In 1842 it founded a school of pharmacy, now a school of the univ. of London. The P. S. has a library of nearly 20,000 books, reports, etc., and a museum of *materia medica*, and publishes the *Journal of Pharmacy and Pharmacology* and the *Pharmaceutical Journal*.

Pharmacognosy, or **Materia Medica**, knowledge of drugs, particularly as regards their origin and their condition in the unprepared state; **pharmacy** is the compounding, use, and administration of drugs as medicines, whereas **pharmacology** (*q.v.*) is the scientific study of drugs and their mode of action. Formerly most drugs were obtained from natural sources, especially plants, as for instance digitalis from the foxglove, ergot from a fungus which parasitises rye, and cocaine from the leaves of the coca plant. Nowadays many drugs are prepared synthetically, though natural products are still important. See T. J. Williams, *Drugs from Plants*, 1949.

Pharmacology, in its widest aspect, is the science concerned with change effected in the function of living material either by the direct action on it of chemical compounds or by their effect on its environment. P. is now generally restricted to the science dealing with the

effect of drugs on man. The first treatise known on P. was that of Dioscorides (c. A.D. 60), and on it all subsequent pharmacopœias have been founded. It was trans. and extended by the Arabs and Persians, who were the authorities on P. in the Middle Ages, and who made some attempts at classification according to the action of the drug. Little advance in P. was made in Great Britain until the seventeenth century, when a series of pamphlets was pub. describing the action of drugs from America and the Far E. Amongst the drugs described were ginseng, salap, and ipecacuanha. In the eighteenth century Anton Stœrck of Swabia investigated and advocated the use of emetics and certain alkaloids; Purkinje experimented on himself to test camphor, belladonna, stramonium, and turpentine; François Magendie (1783-1855) made medical use of compounds of bromide, iodine, and of morphine, strychnine, and other alkaloids. The nineteenth and twentieth centuries have witnessed the discovery of new drugs and the sifting of old ones. Many have been removed from the pharmacopœias as a result of the critical tests made to determine their efficacy. In Germany, U.S.A., and England numerous experiments have been made to discover the effect of various drugs on animals and the maximal and minimal doses. This work has yielded valuable information, but the results must be used with caution, for the effect of a drug on man may be very different from its effect on other animals. The action of drugs on the endocrine organs has been fully investigated.

Since rational treatment of disease must depend on knowledge both of the disease and of the drug and its action, P. is dependent on pathology, chem., and physiology (*q.v.*). Investigation of the action of drugs is made difficult by the fact that drugs acting in very different ways may apparently produce the same effect. The heart, for example, may be accelerated either by drugs paralysing the vagus nerve fibres, or by drugs exciting the sympathetic fibres. Difficulties arise also in connection with the classification of drugs. That at present adopted is based on both chemical and physiological considerations, for attempts to use either separately, or to use a botanical classification, result in grouping together drugs either of different constitution, or of different action, or both. The method of administration of the drug and the size of the dose are also included in the study of P. See MEDICINE; MATERIA MEDICA; PENICILLIN; PALUDRINE; SULPHONAMIDES. See W. E. Dixon, *Manual of Pharmacology*, 1925; J. A. Gunn, *Introduction to Pharmacology and Therapeutics*, 1929; W. Straub, *Lane Lectures on Pharmacology*, 1931; C. Solomon, *Pharmacology, Materia Medica and Therapeutics*, 1934; W. T. Taylor and R. J. Woher, *Laboratory Manual of Pharmacology*, 1948; and F. K. Oldham, F. K. Kuloy, and E. M. Gelling, *Essentials of Pharmacology*, 1948.

Pharmacopœia, book containing formu-

lar for the preparation of compound medicines, especially such a book recognised as a standard. Hist. does not definitely record when the first P. was pub. The first ed. of the Chinese *Materia Medica* is said to have been prepared about 3000 B.C. by the emperor Shon Nung. The Ebers papyrus was written some 1500 years later. Books on materia medica were produced by Theophrastus (380-286 B.C.), Scribonius Largus (A.D. 45), Dioscorides (c. A.D. 60), Galen (A.D. 130-200), and others. Some authorities aver that the first real P. was the *Nuovo receptario composito*, which was made official in Florence at the close of the fifteenth century, or the work prepared by Valerius Cordus which was adopted officially by Nuremberg (in 1516), or that prepared by Adolph Oeco in 1564, which was actually called a P. and made official in Augsburg in 1613. But these books were only 'official' in small ters. The Royal College of Physicians was the first body to prepare a P. which became official throughout the whole country. The project was first discussed in 1585 and, after considerable discussion, the first issue of the P. was produced in May 1615. Only two copies of this issue are known to exist. This was the first *London Pharmacopoeia*, and the colleges at Edinburgh and Dublin issued similar works, revised periodically, commencing in 1699 and 1807 respectively. The disadvantages and dangers of three separate authorities with different names and different standards of strength for their preparations led Parliament to provide, by the Medical Act, 1858, for the pub. of the *British Pharmacopoeia*. National Ps. are pub. in many countries, of which the *United States Pharmacopoeia*, revised every ten years, and the *Fr. Codex* are the most widely used.

Pharmacy deals with the sources, preparation, and supply of medicines. Persons desiring to practise P. or to use the title chemist or druggist in conjunction with retail business must be registered under the Pharmacy Acts, having satisfied the examination and other conditions of the Pharmaceutical Society (*q.v.*).

Pharnabazus, satrap of the Persian provs. bordering the Hellespont, who played a prominent part in Gk. hist. from 412 B.C. to 393 B.C. He was a loyal friend to Sparta.

Pharnaces I. (c. 190-156 B.C.), king of Pontus, the son of Mithridates IV. He waged war upon Eumenes, king of Pergamum, and Ariarathes (181-179), in which the Romans intervened.

Pharnaces II. (d. 47 B.C.), king of Pontus, the son of Mithridates the Great, whom he succeeded in 63 B.C. He encountered the Rom. forces under Julius Caesar, near Zela (47), and was slain in the battle.

Pharos, peninsula, formerly an is. off the N. coast of Egypt; and one of the seven wonders of the ant. world. On founding Alexandria, Alexander joined it to the mainland by a mole. Ptolemy II. erected a lofty tower on this is., and by the light of torches or fires shown from the

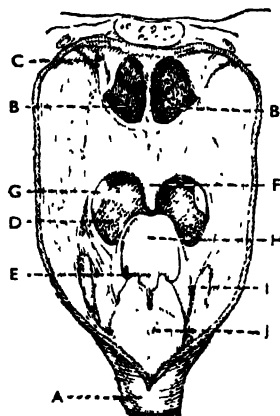
upper windows, ships were guided safely into harbour.

Another P. is that at Dover, one of the most striking monuments of Rom. Britain. With a second at Dover, and another on the cliffs near Boulogne, France, it fitted into a scheme for assisting the navigation of cross-Channel traffic. Possibly it was part of the estab. of the *Classio Britannica*, the Channel Fleet.

Pharos, see LIGHTHOUSE.

Pharsalus (modern **Phersala**), tn. of ant. Thessaly, Greece, 21 m. S.W. of Larissa. In the neighbouring plain of Pharsalia Caesar won his famous victory over Pompey, 48 B.C.

Pharynx, cavity situated at the back of the nose, mouth, and larynx, and above



THE PHARYNX
(opened from behind)

A, Oesophagus; B, posterior part of nostrils; C, Eustachian tube; D, opening to mouth (base of tongue); E, superior opening of larynx; F, inferior opening of larynx; G, trachea; H, epiglottis; I, thyroid cartilage; J, posterior surface of larynx.

the gullet. It therefore serves as a communication between nose and mouth and as part of the air and food passages. It extends from the base of the skull to the level of the sixth cervical vertebra, where it becomes continuous with the gullet. The interior of the cavity is lined with mucous membrane, which is lined with ciliated columnar epithelium in the naso-P., and stratified squamous epithelium in the oral P. Outside this is a layer of fibrous tissue, the *pharyngeal aponeurosis*, and outside that, again, is the muscular coat. The upper portion of the cavity or naso-P. belongs to the respiratory tract, and is joined to the lower portion, or bucco-P., which belongs to the digestive tract, by the pharyngeal isthmus. The P. communicates with the middle ear by

means of the Eustachian tube, and by this means the middle ear can become infected from the P.

Phase Diagrams, see under METALLURGY (PHYSICAL METALLURGY).

Phase Modulation, see MODULATION.

Phases, changes in the appearance of the moon and of a planet due to the illuminated part being observed from different angles. P. increase from the dichotomous to the gibbous stage till, at opposition, the moon, or planet, is 'full,' when the process is reversed and the moon wanes to 'new.' The two inner planets, Mercury and Venus, exhibit P. similar to those of the moon. The P. of the latter can be seen with quite a small instrument, and it was their discovery by Galileo in 1610 that finally established the Copernican system. Of the exterior planets only Mars and a few minor planets show P., and these only gibbous.

Phasianidae, see PHASANT.

Phasis, River, in anct. Colchis, see RION.

Phazania, see FEZZAN.

Phasian, or *Phasianus*, genus of game birds which, according to modern ornithologists, contain six species: *P. colchicus*, *P. reevesi*, *P. ellioti*, *P. himis*, *P. mikado*, and *P. summurangi*. The genus is distinguished by the very long wedge-shaped tail and the absence of a crest. *P. colchicus*, the common P., was introduced from S. Russia and Asia Minor into W. Europe by the Romans, but in the greater part of Europe a true, pure-bred common P. is rare or even non-existent, because of the introduction of other species with which it has freely interbred. Of *P. colchicus* at least thirty local races are known, including the large and desirable Mongolian P., with rich red flanks, green gloss on the plumage, and a broad white ring round the neck, the ring-necked P. which, more than any, has hybridised with the common P. in Britain; and the Jap. P., distinguished by its dark green breast. The other Ps. hybridise with the varieties of the common P., but the offspring is always infertile. Reeves's P. (*P. reevesi*), a native of China, is over 6 ft. in length, and has yellow and brown spangled plumage. *P. mikado* was discovered in central Formosa in 1893; the male is ultramarine blue with a white barred tail. A number of members of other genera of the family Phasianidae are called Ps., including the golden P. (*Chrysolophus pictus*), Lady Amherst's P. (*C. amherstiae*), the pucrus Ps. the kaleke Ps., the eared Ps., and the impeyan Ps. The smallest member of the P. family is the *Ophrysia superciliosa*, the P.-quail, a native of Nepal.

Phasant-shooting in Great Britain. — The season for this sport begins on Oct. 1 and ends Jan. 31. Until the leaves have fallen in the covert, the birds are shot over pointers or setters on rough ground, or with spaniels in hedgerows and small plantations. From about the middle of Nov. battues are organised; the birds, which prefer to run on the ground rather than take to the air to escape danger, being driven to a point from which they

are flushed, and exposed to the fire of a double line of guns. The shooter, who is provided with his own loader, kills corks in preference to hens, and kills only those birds in front of him. As a rule coverts can only stand three battues.

See W. B. Tegetmeier, *Phasants*, 1897, and Hon. Walter Rothschild's article in the *Encyclopædia of Sport*, 1897-98; also B. Fitzgerald, *British Game*, 1948.

Phaidias, or **Phidias** (c. 500-432 B.C.), sculptor of anct. Greece. He was the son of Charmides and was b. in Athens. He studied under the Argive Ageladas, or, according to another authority, under Hegias of Athens. Works which have been attributed to him are a colossal figure of Athena Promachos in bronze, the Lemnian Athena, a gilt Athena at Plataea, and the Zeus at Olympia. He had the opportunity of proving his genius when Pericles appointed him to superintend the adornment of Athens. P. planned the erection of temples and public buildings and, chief of all, the Propylæa and the Parthenon. Fragments of the frieze, metopes, and pediment of the Parthenon were brought to England by Lord Elgin, and are preserved under the title of the Elgin Marbles in the Brit. Museum. P. executed the statue of Athena in ivory and gold about 435 B.C., and six years later was accused of impiety in having introduced his own and Pericles's likeness on the shield of the goddess and of stealing the gold entrusted to him. He was cast into prison, where he d. P. is acknowledged to be the greatest of all sculptors. In beauty of conception and execution he has never been excelled. See A. S. Murray, *Greek Sculpture*, 1880; C. Waldstein, *On the Art of Phidias*, 1835; and A. Hekler, *Die Kunst des Phidias*, 1924.

Phaidon, king of Argos (q.v.), was the first to introduce the use of copper and silver coinage into the Peloponnese.

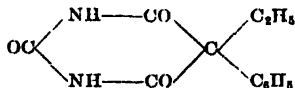
Phelps, Samuel (1804-78), Eng. actor-manager, b. in Devonport. He made his début at the Haymarket in London as Shylock (1837), and was engaged by Macready. From 1844 to 1862 he and Thomas Greenwood produced at Sadler's Wells, Clerkenwell, over thirty Shakespearean as well as other 'legitimate' plays, which had great influence in raising the taste of theatrical audiences. His chief parts were Lear, Macbeth, Othello, and Sir Giles Overreach, but he also excelled in the comic characters of Bottom, Falstaff, and Shallow. See memoirs by J. and E. Coleman, 1886, and life by Max Phelps and J. Forbes-Robertson, 1886.

Phenacetin ($C_9H_9ONH.C_6H_4.OC_2H_5$), white crystalline substance obtained from para-aminophenol. It is soluble in alcohol and glycerine, but slightly soluble in water. It is used in medicine for neuralgia and headaches.

Phenacodus, genus of extinct ungulates in the div. Condylarthra, has been found in the Eocene of America and Europe. It was a digitigrade mammal with fifteen pairs of ribs.

Phenic and Phenol Acid, see CARBOLIC ACID.

Phenobarbitone (phenobarbital, luminal) is phenyl-ethyl-barbituric acid



i.e. $\text{C}_{12}\text{H}_{13}\text{O}_3\text{N}_2$. It is used extensively as a hypnotic and in the treatment of epilepsy, for its depressing action on the cortical activity of the brain. The dose is $\frac{1}{2}$ to 1 grs. (50 to 100 mg.) by mouth or by subcutaneous injection. It has a more prolonged action than barbituric acid (evipan) which is rapidly destroyed and excreted by the body.

Phenocryst, see PORPHYRY.

Phenol, see CARBOLIC ACID.

Phenol-formaldehyde Plastics, see under PLASTICS.

Phenolphthalein ($\text{C}_{20}\text{H}_{14}\text{O}_4$) is prepared by heating phthalic anhydride (3 parts) with phenol (4 parts) and a little strong sulphuric acid to 115°C . It is a white crystalline substance, slightly soluble in water, but dissolves readily in alcohol. It is used in volumetric analysis as an indicator for weak acids. With alkalis it gives a pink coloration, but the presence of acids destroys this coloration. P. is also used in medicine as a mild purgative.

Phenomenology is the science of phenomena in philosophy, involving a contention that the existence of 'substance' is an illusion, that matter is no more than an indeterminate and unknown something underlying phenomena. Phenomenalism originated in Idealism (q.v.) and positivism (q.v.), and later developed into an attack upon the traditional doctrine of substance. Locke and Berkeley in a measure are phenomenologists, Berkeley holding that all objects of knowledge must be phases of mind arising from stages of perception, while Hume argued that if the supposed but unknowable substantial substratum of external sense phenomena is illusory, so is the supposed substantial ego which is stated to underlie the internal phenomena of consciousness. Modern phenomenologists adhere to the theory that there is only one normally 'conscious personality.' The subconscious mental activities of an individual are put together and called the 'subliminal' or subconscious ego or self. In abnormal cases of 'double consciousness' the subliminal self struggles for mastery over the conscious self and is, for a time, successful. P. has a close connection with the science of psychology (q.v.), especially in its bearing upon the 'subliminal self.' Indeed the connection is close enough to cause confusion between the two. In principle the two studies are dissimilar. Briefly P. tries to show that absolute knowledge as an expression of spiritual life is based upon experience, and is the final triumph, as it is the final cause, of the complete process of experience. By P. as may be gathered from the foregoing analysis we generally understand the descriptive study of phenomena as they are immediately presented to experience. But P. may also be described as a philosophic method which makes use

of descriptions which are phenomenological in the usual sense of the word, but which regards them only as a means of seeking something that lies beyond the phenomena. The chief exponent of the phenomenological movement in this later sense of the word was the Ger. philosopher Edmond Husserl (d. 1938), who taught at Freiburg Univ. The P. of Husserl is indeed a description of the immediate data of consciousness; but whereas ordinary academic psychology allows itself to be monopolised by the object, Husserl considers the thinking subject; his psychology is a reflexive psychology. It is the very 'structures' of conscious activity that he tries to discover, e.g. 'perception,' 'distant recollection,' 'exemplification by analogy.' These structures he calls essences. But there is a radical difference between Husserl and Plato: Husserl's essences do not exist in themselves, in a separate world, as ideal types of possible things; they are factual data resulting from the relationship between objects and consciousness. Other phenomenologists who, like Husserl, see consciousness as without content, are Heidegger (q.v.) and Sartre (q.v.). See G. Hegel, *Phenomenology* (trans.), 1910; P. Coffey, *Ontology*, 1914; K. Stavenhagen, *Absolute Stellungnahmen* Erlanger, 1925; J. Hering, *Phénoménologie et philosophie religieuse*, 1925; W. Rieger, *Einführung in die Phänomenologie*, 1926; and M. Farber, *The Foundation of Phenomenology*, 1943. See also G. Gurwitsch, *Les Tendances actuelles de la philosophie allemande*, 1930, and P. Foulquié, *Existentialism* (trans.), 1947.

Phenomenon (Gk. *φαινόμενον*, from *φαίνω*, I appear), that which appears as distinguished from that which exists. The term was once used to denote the world of sense as opposed to the world of reason, but Kant has given it a more extended connotation. In the *Critique of Pure Reason* he says, 'The undetermined object of an empirical intuition is called phenomenon. The empirical intuition is a mere phenomenon in which nothing that can appertain to a thing in itself can be found. . . . In the whole range of the sensuous world, investigate as we may, we have to do with nothing but phenomena.' See NOTION; also H. Spencer, *First Principles*, 1862.

Phenylacetic Acid, see CINNAMIC.

Phenyl Carbinol, see BENZYL ALCOHOL.

Phenyl-methane, see TOLUENE.

Phenyl Methyl Ketone, see ACETO-PHENONE.

Pherecydes: 1. Of Syros, an early Gk. philosopher, fl. about 514 B.C. He is said to have been the teacher of Pythagoras, and to have taught the doctrine of Metempsychosis. 2. Of Athens, one of the early Gk. logographers, was a contemporary of Herodotus.

Phersala, PHARSALUS.

Phi Beta Kappa, oldest Amer. college fraternity, formed in 1776 in imitation, apparently, of the Bavarian order of *Illuminati*, whose first head was Adam Weishaupt, prof. of law at Ingolstadt. The name, formed of three letters of the

Gk. alphabet, is generally supposed to signify the initial letters of the Gk. motto, 'Philosophy is the guide of life.' The society was founded in Virginia, at William and Mary College, Williamsburg, by a number of undergraduates, and branches of it were soon afterwards estab. at Yale and Harvard, and later in practically all the other prin. univs. of the U.S.A. The society, including past and present graduates, is governed by a national council.

Phidias, see **PHEIDIAS**.

Phigalia, ant. tn. of Arcadia, whose site is now occupied by Pavlitzia, 15 m. N.E. of Kyparissia. From its temple of Apollo were brought to the Brit. Museum the Phigalian Marbles, a frieze representing a contest between Centaurs and Lapithæ. The temple was probably built about 430 B.C. by Ictinus.

Philadelphia (the city of brotherly love) is the largest city of Pennsylvania and the third in pop. in the U.S.A. It lies 130 m. N. of Washington, D.C., and is situated on the Delaware R. at the junction with its great trib. the Schuylkill and 96 m. from its mouth. P. was founded by Wm. Penn the Quaker in 1682 as a city in which men of all races might live, each following, unpersecuted, his own religion. It is sometimes called the Quaker city, though the Quaker element no longer prevails. The Daughters of the Revolution, a society of great social importance, has a large contingent here. This tn. is noted, like Boston, for social exclusiveness, and though equally busy, it is a quieter and more sedate city than New York, and inclined to Conservative ideals. It is known sometimes as the 'city of homes,' and is, unlike many Amer. cities, largely composed of small houses. Its 1600 m. or so of streets are laid out, with few exceptions, with chequer-board regularity. One exception is the wide, tree-lined Parkway, completed in 1924, which runs from City Hall Square in the centre of the city to Fairmount Park, which, the best known and largest of the many open spaces, is nearly 2000 ac. in extent. The city hall, formerly the loftiest building in P., is 548 ft. to the top of the statue of Wm. Penn which crowns its tower. The city is noted for its private art collections, and it has also a public gallery, housed in the Academy of Fine Arts. The free public library, founded by Benjamin Franklin in 1731, has fifteen branches in the city. Franklin, who was buried in Christchurch cemetery here, founded also, in 1750, the school that grew in 1755 into a college, and in 1779 into the univ. of Pennsylvania, which now covers 60 ac. and has 9000 students. Its medical, dental, and law schools are particularly noted. P. is celebrated for the efficiency of its elementary schools and for its normal and manual training schools, among which may be mentioned the Drexel Institute and Girard College. The Swedish church of Gloria Dei, built in 1700, is the oldest building in the city. Output of manufactured goods is exceeded only by New York and Chicago, and the city is first in the U.S.A. in the leather

trade and second in manuf. of cigars and clothing. There are large printing and publishing houses. The Baldwin Locomotive Works are the largest in America. There is a great domestic trade in grain, live-stock, fruit, lumber, etc., and a big European trade. Exports are exceeded only by New York, though the city is so far from the sea. It has a total water frontage of 37 m. on the two rivers, about 6 m. on the Delaware being occupied with its harbour, which has some 300 wharves. There is a large gov. navy yard at League Is., just above the tn. P. is one of the most historic cities in the U.S.A., and has an historical society of its own. Independence Hall Building was completed in 1735, and here the constitution of the U.S.A. was framed, and independence proclaimed, as its name indicates. In this building, too, is housed the famous Liberty Bell revered by all Amers. It was the ringing of this bell which announced to the citizens that the declaration of independence of Great Britain had been adopted. P. was the cap. of the Federal states from 1787 until 1800, and the cap. of Pennsylvania from 1683 until 1800 (Harrisburg is now the cap.). The U.S. mint was founded here in 1792. In colonial days P. was a great political centre, and here assembled the hist.-making Continental Congress of 1774. On July 4, 1776, the Declaration of Independence was promulgated here, and Articles of Federation were signed on July 9, 1778. The first cap. of the U.S.A. and its first metropolis, P. has often been compared with Boston, and, like Boston, it is a kind of mirror to Amer. hist., with a copious intellectual tradition and social aristocracy. But it is much bigger than Boston and much more heavily industrialised. It is more complex, with marked interminglings of Pennsylvania Dutch, Scots-Irish, (Germ.), and plain Brit. Like Boston it has a strong puritanical outlook and there is still no alcohol on Sunday, while the cinemas do not open till the afternoon. Finally P. is the only great Amer. city where the political machine is Republican. A great disappointment came to P. in 1916: the city had vainly counted on being the United Nations cap., which might have served to revivify it and renew its ant. distinction. See R. Shackleton, *The Book of Philadelphia*, 1918, and C. Morgan, *The City of Firsts*, 1926.

Philadelphia, city in Lydia, Asia Minor, called in honour of Atalapha Philadelphia of Pergamum (c. 150-138 B.C.); the modern Ala-Shehr.

Philadelphians, sect founded in London in 1672 by Jane Leade and John Pordage, to explain the works of Jacob Boehme (q.v.), the Ger. mystical writer. Their doctrines stressed the necessity of contemplation, and apparently included spiritualism. They disappeared at the beginning of the eighteenth century.

Philæ, islet in the Nile, 5 m. S. of Aswan, in Nubia (q.v.). Length about 1200 ft.; breadth about 450 ft. It is famous for ant. temples and ruins, built by the Ptolemies and by the Rom. emperors,

chief of which are the temple of Isis, 'Pharaoh's bed' (an incomplete Rom. hall), the shrine of Harendotes, and the Propylon. See H. G. Lyons, *Report on the Island and Temples of Philæ*, 1896, 1908, and Boedeker's *Egypt*.

Philanthropy, see CHARITIES; CHARITY, ORDERS OF; CHARITY ORGANISATION SOCIETY.

Philaret, Vasilii Drosdov (1783-1867), Russian preacher, b. at Kolomna. He became bishop of Iteval (1817), archbishop of Tver (1819), and metropolitan of Moscow (1825). He wrote two catechisms (see Blackmore, *The Doctrine of the Russian Church*, 1845) and began a trans. of the N.T. into Russian. See his *Select Sermons* (Eng. trans., 1873).

Philaethes, Eugenius, see VAUGHAN, THOMAS.

Philately. In general usage P. covers both the study and the collecting of postage stamps (*q.v.*), and thus anybody who is actively interested in stamps, from whatever angle, is known as a philatelist. The word P. is derived from two Gk. words, *philos*, meaning 'fond of,' and *telos*, meaning 'exemption from tax.' It was coined by a Frenchman, M. G. Hopin, in 1866, and has long been universally accepted. Stamp collecting started in a desultory manner not many years after the introduction of the first adhesive postage stamps, the Great Britain 1d. black and 2d. blue of 1810, and though, to begin with, the hobby met with a good deal of derision, being the subject even of some caustic verses in *Punch*, it continued to gain fresh adherents, and by the end of the fifties was fairly well estab. Among the famous pioneer Brit. philatelists may be mentioned the Rev. F. J. Stadhforth, Sir David Cooper, Judge Philbrick, Dr. C. W. Vincr, E. L. Pemberton, J. Overbury Taylor, and W. A. S. Westoby.

As early as 1852 J. B. Moens started dealing in stamps in Brussels and in 1861 F. G. O. Berger-Levrault issued, for the benefit of his friends, the first stamp list in Strasbourg. Three months later A. Potiquet issued, in Paris, a catalogue of stamps for sale, while in 1862 the first four, devoted entirely to postage stamps, *The Monthly Advertiser*, appeared in Liverpool, to be followed in 1863 by a London pub., *The Stamp Collector's Magazine*. The first Brit. work on stamps, F. Booty's *Aid to Stamp Collectors*, being *A List of English and Foreign Stamps in Circulation since 1840*, consisting in the main of material previously pub. abroad, came out in 1862. It ran through sev. eds. and was finally reissued with illustrations (the first illustrated work on postage stamps) under the title *The Stamp Collector's Guide*. But the two most important of the early catalogues, both pub. later in 1862, were J. E. Gray's *Hand Catalogue of Postage Stamps for the Use of Collectors and Mount Brown's Catalogue of British, Colonial, and Foreign Stamps*. The first stamp album was produced by a Frenchman, J. Lallier, in the same year and was put on sale simultaneously in Paris and London.

To show how the hobby spread, it may be noted that the first stamp auctions were held in Paris in 1865, in New York in 1870, and in London in 1872; while the first philatelic societies were founded in Paris in 1865, in New York in 1867, and in London in 1869. The two former have long been defunct, but the last, known originally as the Philatelic Society and now as the Royal Philatelic Society (the 'Royal' was added by warrant of King Edward VII. in 1906), is still active and remains unquestionably the leading philatelic society of the world, owning magnificent club rooms and library and publishing its own jour., *The London Philatelist*, since 1892. As stamp collecting grew in popularity the study of stamps became more intense and the desire to read about them more widespread, and if the hobby is recognised as by far the most popular of all hobbies, it may safely be said that the literature concerning stamps is infinitely more extensive than the literature concerning any other hobby. It ranges from elaborate monographs dealing in minutest detail with the stamps of different countries or even individual issues to popular books touching upon the romance, the hist., and the interest of stamp collecting in its every aspect. Many philatelic jour., of which about a dozen are Brit., are pub. throughout the world (before the Second World War there were some two hundred of them), some being highly technical and others consisting mainly of gossip and advertisements. Numerous countries possess official postal museums, but although the Brit. Post Office has an unrivalled collection, in sheets, of Brit. postage stamps, it is not open to the public, though sections of it are exhibited from time to time. In the 'Tapping' collection, left to the nation in 1891 by T. K. Tapping and housed in the King's Library in the Brit. Museum, this country owns the finest of all general collections of postage stamps, while the royal collection of empire stamps, started by King George V. and continued by his successor, is unique in its range and quality. Portions of this collection are occasionally shown.

In the time of Tapping it was possible for one man to form a virtually complete collection of the postage stamps of the world, but that is now impossible, for the market has been flooded for years with unnecessary issues; the number of stamps produced since 1840 has mounted to sev. hundred thousand, and any serious collector to-day is almost forced to devote his attention to one country or epoch or branch of P. Amongst the reasons which have, of later years, so vastly enhanced the popularity of stamp collecting may be cited the introduction of pictorial and commemorative issues and of air mail stamps. The first popular commemorative pictorial issue stamps were issued in the U.S.A. in 1893 to celebrate the discovery of America by Columbus, 400 years previously, and it was probably the success of this set of sixteen stamps which has led to the immense number of

such sets since that date. Great Britain has never issued a pictorial stamp in the real meaning of the word, though of recent years stamps to commemorate the silver jubilee of the reign of King George V., the coronation of King George VI., and other national events have appeared. Nor has Great Britain ever issued an air mail stamp, though some of the most valuable of such stamps, the air mail stamps of Newfoundland issued in the early days of Atlantic flying, emanated from a Brit. dominion.

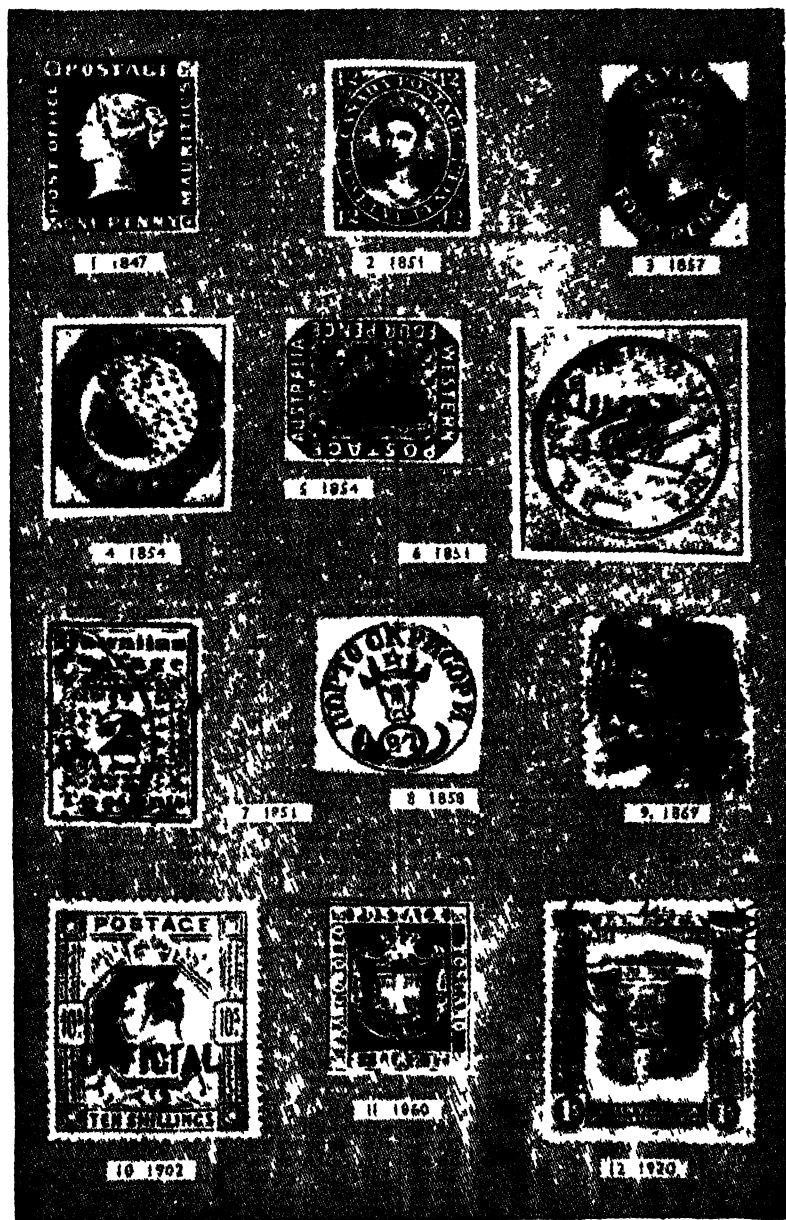
The value and saleability of rare stamps depend, apart from their scarcity, upon sev. factors. First, they must belong to those countries and issues which are particularly collected and, secondly, they must be perfect in every respect. There are many fashions in P., but the earlier stamps of such countries as Great Britain, the U.S.A., Canada, Newfoundland, W. Indies, Cape of Good Hope, Ceylon, Brit. Guiana, Mauritius, New S. Wales, Hawaiian Is., France, Spain, and the It. and Ger. states are practically immune from the vagaries of taste. The really classic stamps of these and other countries, having an international appeal, have mostly risen greatly in price during the last few decades, and this, added to the fact that they are such an easily portable form of wealth, has caused many people in troublous times to regard them as a desirable investment. As for condition, this is a point which, ignored by most of the early collectors, has become more and more significant. The difference in value between superb and poorish copies of even the rarest stamps is startling, and where imperforate stamps are concerned only one in twenty-five or fifty examples has clear margins on all four sides. Many stamps are rare and valuable because they contain errors. The observed variety of such errors is very large, but some of them can be mentioned. There may be a mistake in the wording or the type; a wrong paper or colour or perforation or watermark (q.v.) may be used; a surcharge or overprint (a surcharge alters the face-value of a stamp, while an overprint does not) may be repeated twice or more or

may be printed upside down or on the back or omitted altogether; a price label may be missing; a perforate stamp may be printed imperforate; the centre of a stamp or the frame round the centre may appear in an inverted position. To appreciate how such errors arise it would be necessary to explain how stamps are constructed and printed, but basically they are all due to the fact that though man employs machines, he is not a machine himself.

The highest price known to have been paid for a single stamp is £7343. This was paid by Arthur Hind in the U.S.A. for the Brit. Guiana 1 cent of 1856, the only discovered example of the error whereby the normal '4 cents' label was accidentally replaced by a '1 cent' label. After Hind's death the stamp was put up for auction in London, and withdrawn, the reserve not having been reached. It was returned to the U.S.A. where, it is rumoured, it was privately sold for more than Hind had originally paid for it. Alfred Lichtenstein, it is said, gave £12,000 for an envelope stamped with two matchless copies of the Mauritius 1d. of 1847, while the absolutely mint copy of the Mauritius 2d. of 1847 which King George V., as Prince of Wales, purchased in 1903 for £1150, would undoubtedly bring nearer £10,000 to-day. These were the first two stamps to be issued by any Brit. possession, and through some misunderstanding had 'Post Office' instead of 'Post Paid' printed on them. Other exceedingly rare and valuable stamps, to mention six normal ones and six with errors, include Canada 12d. (1850), Brit. Guiana 2 cents (1851), Hawaiian Is. 2 cents (1851), Ceylon 4d. (1857), Moldavia 81 parales (1858), Brit. Columbia 5 cents (1855), India 4 annas, with inverted head (1854), New S. Wales 4d., with inverted frame (1854), Cape of Good Hope 1d. and 4d., in the colour of each other (1861), U.S.A. 24 cents air mail, centre inverted (1918), Jamaica 1s., centre inverted (1919). The most valuable Brit. stamps are not Victorian but Edwardian: the 8d. and 10s. of 1902 each overprinted 'I. R. Official'. The 10s., so overprinted, was in use for but a brief period, while the 8d. so

SOME FAMOUS POSTAGE STAMPS

1. 1847 *Mauritius*. This 1d. together with a 2d. of the same date, were the first stamps issued by a British colony. They are the most famous stamps in the world.
2. 1851 *Canada*. When this stamp was issued the shilling had a varying value throughout Canada while the penny was constant. Hence the curious figure.
3. 1857 *Ceylon*. Only a few copies are known unused.
4. 1854 *India*. With inverted head, this is the most valuable Indian stamp.
5. 1854 *Western Australia*. A very rare stamp with inverted frame.
6. 1851 *British Guiana*. One of the two first stamps of the colony, not known to collectors in Europe until 1877.
7. 1851 *Hawaii*. The earliest Hawaiian stamps were mainly used by American missionaries writing home; indeed they are often called 'missionaries'.
8. 1858 *Moldavia*. A stamp of great rarity. Moldavia is now a republic of the U.S.S.R.
9. 1869 *United States of America*. The centre of this heavily post marked stamp is inverted, being known as the 'Inverted Flag'. It is a rarity of note.
10. 1902 *Great Britain*. This stamp of Edward VII is one of the two most valuable stamps of Great Britain.
11. 1860 *Tuscany*. In fine condition, this stamp is a classic rarity.
12. 1920 *Jamaica*. With inverted centre, this is one of the rarest British Empire stamps issued during the reign of George V.



overprinted, was in use for only one day, May 12, 1901. But some of the early Brit. 'abnormals' (stamps printed from plates which were hardly ever employed) are also very valuable, as are some of the early high face-value stamps, 10s., £1, and £5, particularly if unused. Most stamps, it may be added, are more valuable unused than used, but the rule is by no means universal, especially if it be a bisected stamp, for during sudden shortages of stamps in the early days this practice was occasionally officially sanctioned in some countries and colonies, and it is necessary to make sure that the postmark is genuine.

The forging of stamps began soon after they came into general circulation, and as long ago as 1862 J. B. Moens wrote a pamphlet (the Eng. ed. is a trans. from the Belgian ed. of the same year) entitled *On the Falsification of Postage Stamps*, while in 1863 T. Lewes and E. L. Pemberton wrote *Forged Stamps: How to detect Them*. The early forgers aimed at defrauding the revenue rather than the collector and much of their work was excessively crude, but the later forgers and fakers (and it is the faking of genuine stamps, either by repairing them or by adding some detail to transform a common stamp into a rare variety, which is the prin. danger these days) have often shown remarkable, if misguided, skill. But it is satisfactory to know that even their most finished efforts cannot deceive the real expert.

Books and articles on P. dealing with every country and every branch and phase of study and collecting abound. For Great Britain the works of H. B. Wright and A. B. Creeke, J. B. Seymour, Sir E. D. Bacon, S. A. R. Oliver and F. H. Valency, T. Todd, and P. Hamilton are of importance. *Bibliotheca Lyndesiana*, 1911, with *Supplement*, 1926, compiled by Sir E. D. Bacon, and *The Standard Index to Philatelic Literature*, ed. by A. H. Harris and analysing books and jour. from 1879 on, are admirable works of world-wide bibliographical reference, but both are now somewhat out of date. Enormous and informative stamp catalogues are issued annually by such firms as Stanley Gibbons in London, Scott in New York, Yvert and Teller-Champion in Paris, Galvez in Madrid, and others. See also **POSTAGE STAMPS**. See T. Todd, *A History of British Postage Stamps* 1919.

Philby, Harry St. John Bridger (b. 1885), Eng. explorer and orientalist, b. in Ceylon. Son of a tea-planter, he was educated at Westminster School and Trinity College, Cambridge. He joined the Indian civil service in 1908, and became political officer in Amara. He led the Brit. political mission to central Arabia, 1917-18. P. crossed the Arabian Peninsula from Uqair to Jidda, and explored the S. provs. of Nejd in 1920. He was Brit. representative in Transjordan, 1921-24. He crossed the Rub al' Khali ('Empty Quarter') Desert in 1932, soon after its crossing by Bertram Thomas. His pub. include *The Heart of Arabia* (1922); *Arabia of the Wahabis* (1928);

Arabia (1930); *The Empty Quarter* (1933); *Pilgrim in Arabia* (1943); and *Arabian Days* (1948).

Philemon, Gk. writer of the New Comedy, b. at Soli in Cilicia according to Strabo, or at Syracuse according to Suidas. P. began to exhibit comedies a little earlier than Menander and before 328 B.C., and died in the reign of the second Antigonos, son of Demetrius. He lived nearly 100 years. He is said to have written ninety-seven comedies, of which only fragments exist, which are generally pub. with those of Menander, whose rival he was. The best ed. is by Meinecke (Berlin, 1823). See MENANDER.

Philemon and Baucis, in Gk. mythology, a devoted married pair, gave entertainment to Jupiter and Mercury when they had been refused hospitality by every other house in the vicinity. The gods took them to the top of a hill whence they saw their vil. submerged in flood, their own cottage only rising in the form of a temple above the water. When Jupiter asked them to make a request, they begged to serve in his temple and to die together. Accordingly at death Zeus changed Philemon into an oak and Baucis into a linden.

Philemon, Epistle to, book of the N.T., being the shortest of the epistles written by Paul during his imprisonment. In twenty-five verses the apostle addresses P., an hospitable Christian of Colosse, asking him to take back his former slave, Onesimus, who, having first robbed his master, had run away, probably to Rome, where he had been converted to Christianity by Paul. No adequate proof has been brought against the authenticity of the epistle, although in the fourth century some critics held that the subject matter was too trifling to have been written by Paul, while in the nineteenth century others regarded it as a mere literary pamphlet on the slave question. See commentaries by C. J. Ellicott, 1865; J. B. Lightfoot, 1884; and J. A. Beet, 1890; and article in Hastings's *Dictionary of the Bible*, vol. ix., 1917.

Philetas of Cos (fl. fourth to third century B.C.), Gk. elegiac poet and grammarian of the Alexandrian school. He was tutor to Ptolemy II. and wrote a commentary on Homer. See fragments of his poems in T. Bergk, *Poetae Lyrici graeci*, 1882.

Philharmonic Societies. The Eng. Philharmonic Society was founded in 1813 by J. B. Cramer and others, to foster musical ideals by giving concerts on a subscription basis; its career has been most successful. P. S. are estab. also in New York and elsewhere.

Philidor, André (c. 1647-1730), Fr. composer, b. probably in the Dauphiné, entered the royal service as a boy, played all sorts of instruments there, competed with Lully in writing fanfares, marches, etc., and was soon commissioned to provide dances and stage diversions. In 1684 he became librarian of the king's musical library and made a huge MS. collection of court and church music. His works include diversissements *Le Carnaval*

de Versailles, *Le Mariage de la Couture avec la grosse Cathon, La Princesse de Crée, La Mascaraude du raiasseau marchand, Le Jeu d'échecs*, etc.

Philidor, Anne (1681-1728), Fr. composer, b. in Paris, son of André P., entered court service as obolst in the chamber music and the royal chapel, founded the *Concert spirituel* in Paris, 1725, and later in life superintended the Duchesse de Maine's and the Prince de Conti's private concerts. His works include pastorals, *L'Amour vainqueur, Diane et Endymion, Danaë*, etc.

Philidor, François Andre (1726-95), Fr. musician and chess player, b. at Breux. His chief operas are *Blaise le Savetier* (1759); *Le Soldat magicien* (1760); and *Tom Jones* (1761). He was regarded as the finest chess player of his age, and pub. *Analyse du jeu des échecs* (1777). See G. E. Bonnet, *Philidor et l'évolution de la musique française du XVIIIe siècle*, 1921.

Philip, St., was the first disciple of Jesus Christ and one of the apostles. He was a native of Bethsaida, a tn. near the sea of Tiberias. He has been erroneously confounded with Philip the Deacon. P. suffered martyrdom at Hierapolis, but in what year is not known.

Philip, kings of Macedonia, see **PHILIPPOS**.

Philip I. (1052-1108), king of France. He succeeded to the Fr. throne in 1060. At first the ally, he afterwards became the opponent of William the Conqueror, and they quarrelled principally over the possession of Maine. He quarrelled with the papacy because of his bigamous marriage with the countess of Anjou. He widened the boundaries of France, however, by the annexation of Valois and the Vexin.

Philip II. (1165-1223), king of France, commonly known as Philip Augustus, b. at Gonesse. He was crowned king during the lifetime of his father, Louis VII., and succeeded him in 1180. To him really belongs the credit of attempting to consolidate the whole of the forces of France. With this end in view he supported the sons of Henry II. of England in most of their frequent quarrels with their father. He succeeded also in subduing the count of Flanders and the duke of Burgundy. He was one of the chief conspirators in the league which did much to crush the power of Henry II. in France. He went on crusade with Richard I., but quarrelled with him, and returned from Syria to plot against him. The sudden return of Richard, however, upset the plans of P. and John, and resulted in a war which lasted until 1199. On the accession of John he supported the claim of Arthur of Brittany to the Eng. throne. On the murder of Arthur he summoned, as John's overlord, the Eng. king to answer for the deed in Paris, and when John failed to appear invaded Normandy. The fall of Château-Gaillard resulted in the practical conquest of Normandy, and virtually put an end to the Angevin empire. The hallmark of his success, however, was the battle of Bouvines in 1213, where he succeeded in defeating the combined forces of England and the empire. The rest of his

reign was occupied in building up the social fabric in France and in strengthening Fr. institutions. He had some difficulty with the papacy owing to his divorce of his wife Ingeborg. The papacy was for the time strong enough—it was the days of Innocent III.—to force him to put away Agnes of Meran and take back Ingeborg of Denmark. See A. Luchaire, *La Société française au temps de Philippe-Auguste*, 1909, and life by W. Hutton, 1896.

Philip III. (Le Hardi) (1245-85), son of Louis IX. (St. Louis), b. at Poissy. He accompanied his father's unfortunate expedition to Tunis, which was in the original plan to have been a crusade. He was present at his father's death, and succeeded him in 1270. Before his death he fought a long and unsuccessful war with Aragon.

Philip IV. (1268-1311), commonly called 'Le Bel,' king of France, b. at Fontainebleau, succeeded Philip III. in 1285. He married the queen of Navarre, Joanna, and by this marriage obtained Champagne, Brux, and Navarre. Early in his reign a revolt broke out in Flanders, and P. suffered a great defeat at Courtrai, the precursor of the overthrow of chivalry by the new infantry tactics. His attempt to levy taxation upon the clergy led to the quarrel with Pope Boniface VIII., one which involved Edward I. and the Eng. nobles, and led to the first practical anti-papal legislation in England. Boniface issued the famous bull, *Unam sanctam*, and P. replied by a wholesale confiscation of clerical property. The pope retaliated by an excommunication and a threat of interdict. P. caused the pope to be arrested and so maltreated that he d. shortly afterwards. After the brief pontificate of Boniface's successor, Benedict XI., a Fr. pope, Clement V., was elected and, under the influence of P., moved the papal court to Avignon, where it remained for seventy years. In this reign the order of the Knights Templars was abolished, and the wealth of that order confiscated by the Fr. king. He greatly increased also the taxation of the country. See G. Lizerand, *Clement V. et Philippe*, 1910.

Philip VI. (1293-1350), king of France, the first of the Valois kings. He was the son of Charles of Valois, the brother of Philip IV. On the death of Charles IV. in 1328 he succeeded to the Fr. throne, the Salic law being pleaded in order to prevent the accession of Charles the Bad of Navarre and Edward III. of England. Edward pleaded that although the Salic law might hold good in excluding a woman from succeeding in person, still her claim could be transmitted through her son. The succession question, however, was but the pretext for the Hundred Years war; in reality it was caused by the desire to protect the woolen trade with Flanders, the continuedcession of the Fr. in Guienne, and the constant quarrels between the Norman sailors and the men of the Cinque Ports. The war may be said to have begun in 1336. The first great battle was off Sluys, where the Fr. fleet was entirely destroyed. In 1346,

after threatening Paris, Edward retreated towards Flanders, but Philip pursued and was defeated at Crécy. The tactics adopted by Edward on this occasion led to the complete overthrow of the Fr. chivalry, and the Eng. followed up their victory by the siege and capture of Calais. The war ended for a time owing to the outbreak of the Black Death.

Philip II. (1527-98), king of Spain, the only son of the emperor Charles V., b. at Valladolid. He married, in 1543, the daughter of the king of Portugal, who bore him before her death, in 1546, a son, Don Carlos. This prince, a vicious idiot, ended his days before his father, being imprisoned by him and dying in prison in 1568. P. spent much of his time in his father's favourite prov., the Netherlands, and before the death of his father he married, in 1554, Mary I. of England. In the



PHILIP II.

following year his father abdicated and P. became the most powerful monarch in Europe, although his father's attempt to obtain for him the imperial throne failed. He left England at the end of fourteen months, dissatisfied also that Mary had failed to bear him a son. He succeeded in breaking up the formidable league raised against him by the papacy and the Fr., and set himself up in Europe as the champion of the counter-reformation. He crushed heresy in Spain by means of an energetic use of the Inquisition, but failed in the Netherlands, where his oppressive measures and his heavy taxation led to revolt, civil war, and finally to the breaking away of the United Provs. (Holland). In 1570 he married Anne of Austria, who became the mother of Philip III. In the following year his half-brother won the great victory at Lepanto over the Turks. He annexed Portugal to Spain in 1580, claiming the throne on the extinction of the male line. After the execution of Mary Queen of Scots, and irritated by the frequent raids of the Eng. privateers, he sent his Armada to England. This, in 1588, was badly defeated. His home policy had led to the practical bankruptcy of Spain, and his long war against

the Moors led to the extinction of much of the trade of the country. In 1592 he failed in his attempt to drive Henry of Navarre from the throne of France. P. had great ability, but his ability was overshadowed by his fanaticism. He raised Spain to a dominant position in Europe, but left her with a governmental system which undermined her prosperity. See W. H. Prescott, *History of the Reign of Philip II.*, 1855-58; and lives by M. Philippson, 1882; L. Bertrand, 1929; D. Loth, 1932; L. Pfandl, 1938; and W. T. Walsh, 1938.

Philip III. (1578-1621), king of Spain, b. in Madrid, the son of Philip II. by his third marriage, he succeeded to the throne of Spain in 1598. He left the government of the country practically in the hands of his minister, Lerma. During his reign occurred the attempt to bring about a Sp. marriage with Prince Charles (afterwards Charles I.) and the outbreak of the Thirty Years war, in which Spain was very largely involved. Previously, in 1609, a treaty was made with the United Provs. which practically assured them of their independence, although this was not officially recognised until 1648.

Philip IV. (1605-65), king of Spain, b. at Valladolid. He succeeded his father Philip III. in 1621, and during the early part of his reign the country was unsuccessfully governed by Olivarez. The Dutch captured many of the Sp. colonial possessions; Portugal recovered her independence in 1641, and two years later, by the defeat at Rocroi, the prestige of the Sp. Army was badly shaken. After the Peace of Westphalia was signed in 1648, the Spaniards and Fr. still continued fighting, until by the treaty of the Pyrenees (1659), Spain ceded much territory to France. In 1665 Portugal defeated Spain at Villa Vicosa; in the same year P. died.

Philip V. (1683-1746), king of Spain, the first of the Bourbon kings of Spain, b. at Versailles. He was the second son of the dauphin of France and the grandson of Louis XIV. and Maria Theresa of Spain. He entered Madrid in 1701, and at the end of the War of the Sp. Succession was by the treaty of Utrecht guaranteed the throne of Spain, certain stipulations being made to prevent his obtaining the throne of France as well. He married, as his second wife, Elizabeth Farnese, and as a result of her overweening ambitions in Italy for the sons of her former marriage, was involved in a struggle with the Austrians. P. abdicated for a short time in 1724, but on the death of his son again took his place on the throne. He still aspired to the Fr. throne, but the birth of heirs to Louis XV. ended his hopes and resulted in the family compact in 1733.

Philip I. (1478-1506), king of Castile, surnamed the Handsome, b. at Bruges. He was the son of Maximilian I., emperor of Germany, by Mary of Burgundy, in right of whom he inherited and transmitted to his posterity of the house of Austria the seventeen provs. of the Netherlands. In 1496 he married Joanna, eldest daughter of Ferdinand the Catholic and Isabella,

sovereigns of Aragon and Castile; and in 1504, on the death of Isabella, who bequeathed the kingdom of Castile to her daughter, P., as well as his consort, assumed the royal title. He was crowned at Burgos with her, and, in consequence of her mental weakness, exercised all the functions of government during the short remainder of his life, which closed in the following year at the early age of twenty-eight.

Philip Neri, see NERI.

Philip of Greece and Denmark, Prince, see under EDINBURGH, DUKEDOM OF.

Philip of Macedon, see PHILIPPOS.

Philip the Bold (1342-1404), founder of the second and last ducal house of Burgundy, was the third son of Jean, king of France, and was b. at Poitiers. He was present at the battle of Poitiers (1356), and displayed such heroic courage as gained for him the sobriquet of *le Hardi*, or 'the Bold.' On the accession of his brother, Charles V., to the throne, he married Margaret, the heiress of Flanders. In 1372 he commanded the Fr. army opposed to the Eng. In 1380 he exerted himself to suppress the sedition of the Flem. tns. against the crown, and, raising an army, inflicted upon them the bloody defeat of Rosbeck (Nov. 27, 1382), killing 26,000. Flanders, Burgundy, Artois, Rethel, and Nevers fell to him by the death of the count in 1384. Energy and wisdom characterised his gov., and his ter. was one of the best governed in Europe. During the minority and subsequent imbecility of his nephew Charles VI. of France, he was obliged to take the helm of affairs and on his way to repel the Eng. attack on Flanders he d. See life by O. Cartellieri, 1910.

Philip the Evangelist, one of the seven deacons chosen to relieve the twelve apostles of the burden of attending to charitable distribution (Acts vi.). He was driven from Jerusalem by the persecutions and went to Samaria to preach, where he had great success. Thence he was sent to guide the Ethiopian eunuch to the truth (Acts viii.). P. then went on a preaching tour to Caesarea, and later he entertained St. Paul and his company (Acts xxi.). Tradition says that later he settled in Asia Minor, but he has been confused with Philip the apostle. It is probable that he d. in Tralles.

Philip the Good, third Duke of Burgundy (1396-1467), grandson of Philip the Bold. On the assassination of his father at the instigation of the dauphin (afterwards Charles VII.), he succeeded to the duchy. Bent on avenging the murder of his father he entered into an alliance with Henry V. of England at Arras in 1419. Some disputes with the Eng. prompted P. to conclude a treaty with the king of France in 1439. However, the Eng., by ceding to P. the prov. of Champagne and paying him a large sum of money, restored him to their side. Smarting under some fresh insults of the Eng. viceroy, he made a final peace (1455) with Charles. Later he declared war against the Eng., and, in conjunction with the king of France, gradually expelled them from their Fr.

possessions. He was the founder of the Order of the Golden Fleece.

Philiphaugh, battlefield on Yarrow Water, 3 m. W.S.W. of Selkirk, Scotland, where Sir David Leslie defeated the Royalists under Montrose (1645).

Philippine Egalité, see ORLEANS, DUKES OF.
Philippeville (anc. Rusicada), seaport of Algeria, in the dept. of Constantine. It has a fine harbour, and exports cattle, cereals, dates, esparto grass, and minerals. Pop. 66,000.

Philippi, anc. city of Macedonia, on the Gangites, was so called after Philip II. of Macedon. It is celebrated for the victory of Antony and Octavian over Brutus and Cassius in 42 B.C. St. Paul founded (A.D. 53) a Christian colony here, to which he addressed his epistle to the Philippians.

Philippians, Epistle to the, probably the last of the epistles which St. Paul wrote during his captivity at Rome, during the latter part of this period. Its date would therefore be between 62 and 64 according to the ordinary chronology, between 57 and 59 according to that of Harnack. The church in Philippi had been planted some ten years previously on the second missionary journey (see Acts xvi. etc.), and was composed chiefly of pious Gentiles. In the region in which Philippi stood women occupied a higher social position than elsewhere, and the epistle shows us the importance of the feminine element in the Church. See J. Hastings, *Dictionary of the Bible*, 1898; and commentaries by J. B. Lightfoot, 1891; C. R. Biggs, 1900; H. Lietzmann, 1911; M. Jones, 1918; and H. G. G. Herklotz, 1946. See also H. N. Bate, *Guide to the Epistles of St. Paul*, 1926, and articles on PAUL.

Philippios, three orations of Demosthenes, the Grecian orator, against Philip, king of Macedon, in which the orator sought to arouse the Athenians from their indolence; hence any discourse or declamation abounding in acrimonious invective, e.g. the fourteen orations of Cicero against Mark Antony.

Philippine Islands, or **The Philippines**, archipelago forming the republic of the Philippines, situated about 550 m. off the N.E. coast of Asia, between 4° 40' and 21° N. They are bounded on the W. by the China Sea, E. by the Pacific Ocean, and S. by the Celebes Sea and the coastal waters of Borneo. The total land area of the P. I. is 111,400 sq. m., and includes the is. of Luzon, 40,420 sq. m., most northerly; Mindanao is. 36,337 sq. m., most southerly; Samar, 5050 sq. m.; Negros, 4905 sq. m.; Palawan, 4500 sq. m.; Panay, 4446 sq. m.; Mindoro, 3739 sq. m.; Leyte, 2799 sq. m.; Cebu, 2000 sq. m.; Bohol, 1611 sq. m.; Masbate, 1262 sq. m.; and over 7000 others, mostly very small. Of volcanic origin, the physical features are hilly and mountainous. On the E. coast of Central and N. Luzon is the Sierra Madre range, on the W. coast is the Caraballo Occidentales, N. from the gulf of Lingayon, and the Zambales southward from that gulf to Manila Bay. Mt. Mayon (8280 ft.), an active volcano, lies at the S.E. extremity of Luzon, and Mt.

Apo (10,312 ft.), on the E. border of the S. portion of the basin of the Rio Grande, Mindanao, is an extinct volcano, and the highest elevation in the archipelago. The Cagayan R., 220 m. long, in N. Luzon, is the largest in the archipelago; the Rio Grande de Mindanao (200 m. long) in Mindanao is second in size. The Pam-panga and the Agno are the prin. rvs. in Central Luzon, and the Rio Bohol, which rises in Lake Bato and flows N.N.W. into San Miguel Bay, is the prin. riv. of S. Luzon. The other is. are drained by many streams, some of which are of considerable size. Laguna de Bay, the largest body of fresh water in the P. I., is situated in the lowland basin of Central Luzon, 6 m. inland from Manila Bay. The other prin. lakes are: Lake Taal (17½ m. long), S.W. of Laguna de Bay; Lake Cagayan in N. Luzon; in Mindanao, Lanao, Liguasan, and Buluan in the W.-central portion, and Mainot, Pinava, Dagun, Dalocum, and Linao in the valley of the Agusan. There are small lakes in some of the other is. The volcanoes in the archipelago are as follows: Babuyan Claro, Camiguin de Babuyan, and Diddas in the Babuyanes Is. off the N. coast of Luzon; Cagua or Cagua in N. Luzon; Canlaon and Magaso in Negros; Camiguin de Mindanao in the is. of Camiguin, off the N. coast of Mindanao; Apo and Calayo in Mindanao; and Taal and Mayon, the only ones about which eruptions are recorded; Taal has been silent since 1751, but twenty-six eruptions of Mayon occurred in the nineteenth century, the most destructive of which was in June 1897, when the tn. of San Fernando and many vls. were destroyed. Earthquakes and typhoons are of frequent occurrence in the is.

The fauna of the is. shows a large degree of specialisation, but the number of species and their respective ranges have not yet been satisfactorily determined. There are about 690 species of birds; crocodiles and fishes, of which there are 500 species, are numerous. Arthropoda are very abundant. The flora, which is essentially Malayan and intermixed with Chinese and Australian elements, is rich and varied. Two thirds of the land surface is covered with forests; gutta-percha, india-rubber, and other trees yielding gums, largely abound, and there are also good timber trees, dye woods, etc. The soil, usually of a reddish colour, is for the most part disintegrated lava mixed with decayed vegetation. The climate, which is more salubrious than most tropical climates, varies little throughout the year, temp. being uniformly high. Agriculture is the prin. industry of the is., and the prin. crops are hemp, sugar, tobacco, coconuts, corn, sweet potatoes, and rice. Many fruits have been introduced, including grapes, blackberries, figs, and strawberries, but bananas, mangoes, and citrus fruits are more generally grown. The production of rubber is increasing, especially in the S., and 1,200,296 kilos of crude rubber were exported in 1940. The P. I. are among the world's foremost producers of coco-nut oil and copra.

During 1947 copra exports totalled 998,140 metric tons. There are also papaya, lanzones, chico, pilluit (*Canarium commune*), oranges, and mandarins. In 1918-49 5212.3 million lb. of rough rice were produced. Manila hemp (abaca), sugar-cane, maize, tobacco, and magny are also important products. With the exception of the water-buffalo, which is indispensable for agric. purposes, the domestic animals are few in number but are steadily increasing. Amor. horses have been introduced to improve the breed. The neat cattle, which are of Australian and Indian origin, are raised chiefly for beef, hides, and horns. Swine and goats are numerous, but there are few sheep. The is. are potentially rich in economic minerals, and extensive gold-mining operations have been instituted in the provs. of Benguet and Ambos Camarines in Luzon, and on the is. of Masbate. In 1940 the output of gold was valued at \$38,000,000. Mining installations were, however, largely removed by the Jap. during the war; three mines were restarted in 1947. Some silver and platinum is recovered with the gold. Chromite has been discovered; in 1940 190,000 long tons were produced, but in 1946 only one mine was working, 58,000 long tons being produced. Copper is widely distributed. There are outcrops of lead, with which silver is largely associated, and extensive deposits of iron-ore (production in 1940 was 1,220,000 long tons). Among other minerals are manganese ore, sulphur, mercury, zinc, gypsum, and phosphate; coal has been discovered, asbestos, rock asphalt, and silica deposits have been found, and drilling for oil was resumed in 1947. The first railway, opened in 1892, was built by an Eng. corporation under the guarantee of the Sp. Gov. from Manila to Dagupan (121 m.). The advent of Amer. rule saw a great increase in railways, and in 1948 there were some 490 m. of track on Luzon, and 73 m. on Panay and Cebu. Roads also have been greatly improved and extended (total length of roads is 14,933 m.), and there are regular steamers to Singapore and Hong Kong, and between the prin. ports of the archipelago. The greatest value of pre-war commerce was with the U.S.A., the 1910 figure being 469,000,000 pesos, then Japan (30,000,000 pesos), Great Britain (11,000,000 pesos), China (10,000,000 pesos), Dutch E. Indies (0,000,000 pesos). In 1938 exports to the United Kingdom were valued at £92,523; in 1946 at £72,498; imports from the United Kingdom were £747,003 in 1938 and £349,066 in 1946. Total imports in 1948 were valued at 1,037,577,000 pesos and exports at 619,713,000, 93 per cent of the latter being accounted for by coco-nut and abaca products. Before the Jap. invasion there were forty-six sugar centrals and four refineries, textile mills, desiccated cocoa factories, coco-nut oil mills, ninety-two large cigarette and cigar factories, and 2391 rice mills. In 1947-48 307,913 short tons of sugar were produced (the average pre-war output was 900,000 tons).

Tobacco output was 17,650,000 kilos in 1947-48. In 1946 free trade was established between the U.S.A. and the P. I. for eight years. There are twenty-one fine harbours. Manila, the prin. port of entry, with a channel 30 ft. deep, has the finest harbour in the entire Far E. At Cavite is a navy yard which still belongs to the Amer. forces. After Manila, the cap. (pop. 1,024,500), the chief tns. are Iloilo on Panay (pop. 94,300); Cebu on Cebu (155,100); Zamboanga on Mindanao (137,700); Davao on Mindanao (103,100); and Baguio (27,000) in the Mt. Prov. (the summer cap.) (all pop. figures are those estimated before the Jap. invasion); other tns. are Legaspi, Iloilo, Vigan, and Naga on Luzon. The total pop. of the archipelago according to the 1948 census was 19,234,182.

Constitution and Government.—The new independent republic of the P. I. came into being on July 4, 1946, by agreement with the U.S. Gov. embodied in an Act of Congress signed by President Roosevelt on March 21, 1934, accepted by the Philippine Legislature on May 1, 1931, and ratified by the Philippine electorate soon afterwards. This Act, which, a ten-year transitional period designated as that of the 'Philippine Commonwealth,' at the end of which complete independence would become automatically effective. But, owing to the Jap. invasion and occupation, this period had to be prolonged. The republic is governed by a constitution adopted in 1935 and amended in 1940. The president and vice-president are elected for four years and the former may be re-elected for another term. There are eleven departmental secretaries: foreign affairs; interior; justice; national defence; health; education; finance; public works and communications; labour; commerce and industry; agriculture and national resources. The legislature is bicameral: a Senate of twenty-four, and a House of Representatives of ninety-eight members, all elected on April 23, 1946. The franchise is given to both male and female citizens twenty-one years of age or older who can read or write Sp., Eng., or a native dialect and who have certain residential qualifications; but rural illiteracy is high, and at the 1946 elections the voters numbered not more than 2,500,000; the figure reached 3,000,000 in the 1947 general elections. The president's powers are wide, including control of the provs. and municipalities and limited powers of veto. The constitution vests in the republic all ownership of the natural resources which, apart from public agric. land, may not be alienated. Exploitation of natural resources is limited to citizens of the P. I. or of the U.S.A. and to corporations or associations 60 per cent of whose capital is owned by Filipinos or Amers. (see J. M. Aruego, *The Framing of the Philippine Constitution*, 2 vols., Manila, 1937). Despite the proclamation of the new republic, close relations by agreement between the P. I. and the U.S.A. remain. Under Amer. pressure an agreement of 1946, expiring in 1974, opened to Amer. interests or companies the exploitation of

any public utility business or resources open to Filipinos.

The U.S.A. is allowed to develop and maintain strong military, naval, and air bases in the archipelago (the is. fortress of Corregidor in Manila Bay was, however, transferred to the republic of the P. I. on Oct. 11, 1947). Until the republican gov. has trained a foreign service staff, the U.S.A. will continue to represent Filipino interests abroad. Furthermore the Philippine Trade Act, signed by President Truman on April 30, 1946, assures the continuance of complete free trade between the two countries for eight years ending July 3, 1954; to the end of 1954 Filipino exports to the U.S.A. pay a duty equal to 5 per cent of the existing Amer. duties, and the duty thereafter increases by 5 per cent a year annually until the full duty is payable after July 3, 1974. But the Amer. system for import quotas is maintained for Filipino sugar, tobacco, and rice.

Religion.—Rom. Catholicism is the chief religion, and has some 12,604,000 adherents or 80 per cent of the pop. An independent Filipino Church was founded in 1902 by Gregorio Aglipay, an ex-Catholic priest, who assumed the title of Obispo Maximino. The ritual of this Church resembles that of the Rom. Church, but in doctrine it adheres to modern science and denies the possibility of miracles, and marriage is permissible to its apostles. The following of this Church is about 1,500,000. There are about 350,000 Protestants, 45,000 Buddhists, 678,000 Muslims (chiefly in Mindanao and Sulu); 14,000 Shintoists; 630,000 Pagans; and 67,000 others.

Education.—Education in the public schools is free, secular and co-educational. In the urban schools Eng. is taught, but is no longer the official language. In 1945-1946 there were over 2,500,000 pupils in the 11,791 public schools and there were nearly 47,000 Filipino teachers. There is a normal school, six regional normal schools, trade schools, and agric. and farm settlement schools. Higher education is provided by the state-supported univ. of the Philippines, which in 1941 had over 700 profs. and 7600 students; and by about ninety private institutions of higher learning, including the univ. of Santo Tomas. There are also 468 private schools accredited by the gov. for secondary education.

Justice.—The judiciary is headed by the supreme court, with a chief justice and ten associate justices, all Filipinos, appointed by the president; it cannot declare a law or treaty unconstitutional except by a two-thirds vote. There are sixteen judicial dists., each with sev. judges of first instance, justices of the peace courts, and municipal courts.

The Filipinos. The word 'Filipino' may be used with the following meanings: (1) a native of the P. I. of Sp. descent; (2) the Christian pop. of the P. I., numbering about 15,000,000; or (3) the native pop. of the P. I. The Filipinos, in the widest sense of the word, are a mingling of many

racés, speaking perhaps a hundred of differing languages or dialects, professing different religions, and living in various grades of civilisation. There are over eighty ethnic groups. About 30,000 are 'Negritos' (Negroes of the P. I.), who appear to be a small remnant of the original inhab., and they are a dwarfish race, believed to be akin to the Australian 'black' natives. The Sulu Archipelago, W. Mindanao, and W. Palawan are inhabited chiefly by some 100,000 Moros (Sp. for 'Moors'); like most of the natives they are of Malay stock (mainly from Borneo), and chiefly differ from the others in their religion, being Muslims, while the others are mostly Christian. They have a native literature, and use a modified Arabic alphabet. Special mention must be made of the five to six thousand mt. peoples (Buid, Hanunó, and Tagbanwa) of the pagan pop. of Palawan and Mindoro, since, alone in the whole of the archipelago, these have preserved their ancient native scripts, elsewhere replaced by the Rom. alphabet.

The bulk of the native pop., numbering about 16,500,000, speak languages belonging to the great Malayo-Polynesian family (see under LINGUISTIC FAMILIES). In point of number the three most important groups are (1) the Bisayans or Visayans (nearly 7,500,000), the most civilised people in the archipelago, when discovered by the Spaniards, now mainly living in the central part of the P. I. and in N. and E. Mindanao; (2) the Tagalogs or Tagals (c. 4,250,000), now the most advanced people of the P. I.; they live in central Luzon, including Manila, and in the greater part of Mindanao; (3) the Iloks or Ilocanos (c. 2,500,000), mainly in N.W. Luzon. Other important vernaculars are Pampangan (c. 650,000), mainly in the prov. of Pampanga, to the N. of Manila Bay; Pangasinan (c. 600,000), N. Luzon; and especially Bikol or Bicol (c. 1,300,000), also in Luzon. Sp. and Eng. are the official languages, and a kind of 'pidgin' Sp., known as Filipino-Sp. or *español de cocina* ('kitchen Spanish'), is widely used.

History.—Magellan (q.v.) arrived at the P. I. in 1521, and in 1565 Spain took final possession of the archipelago; but after nearly four centuries of misgovernment and unrest, and following on the revolt of 1896, in which Ibal (1861-96) and the 'Young Filipino party' played the prominent part, the is. were lost by Spain to the U.S.A. as the result of the war of 1898-1901. Following on the re-establishment of the civil courts and civil municipal govts. at the conclusion of the Sp.-Amer. war, a Philippine Commission of five members was appointed by the Amer. president in 1900 to determine the legislative functions of the central gov. at Manila. In 1907, after the completion of the census, a popular assembly of eighty members was opened at Manila. Later the P. I. were governed by a governor-general, appointed by the U.S. president, assisted by a Cabinet of six, of which five had to be Filipinos. After the cession to the U.S.A. the progress of the Filipino was rapid, and, in 1934, as indicated

above, the U.S.A. promised to give independence to the is. Then, however, came the Second World War and with it, in 1941, the invasion of the P. I. by the Jap.

When Guam and Wake Is. were lost by the Amers. in Dec. 1911 their chances of reinforcing the P. I. in the face of Jap. naval and aerial superiority became remote. In any event Amer. exports had, before the war, long been doubtful about their ability to defend the is. in view of their remoteness from the main Amer. bases, and moreover the possibility of strengthening their permanent defences before 1937 was prohibited by the treaty of Washington, and the early abandonment of Amer. control was contemplated in the Act of 1934 which provided for full Filipino independence in 1946. The Amer. policy was in fact one of deliberate withdrawal from an advance base, which was generally held to be indefensible. This policy had to some extent been modified after 1933 by Gen. MacArthur (q.v.), who took command of the archipelago in that year and held such pronounced views on the possibilities of defence that two years later he retired from the Amer. Army and began to build up a strong Filipino force against the day when the Amer. garrison should be evacuated. As Jap. penetration pressed southward into Fr. Indo-China and Amer. policy began to stiffen against further aggression, the weight of MacArthur's opinions began to make itself felt and he was recalled to take command of the forces in the Far E., and the garrison of the P. I. was strengthened with considerable reinforcements during 1941. The Jap. attacked the P. I. on Dec. 9, 1941. For details of military and naval operations see PACIFIC CAMPAIGNS IN SECOND WORLD WAR; see also MANILA.

See J. A. Robertson, *The Philippine Islands and their People*, 1898, and *Bibliography of the Philippine Islands* (Cleveland, Ohio), 1908; J. Blount, *American Occupation of the Philippines*, 1913; L. H. Fernandez, *The Philippine Republic*, 1926; Z. M. Galang, *Encyclopedia of the Philippines*, 6 vols. (Manila), 1936; G. A. Malcolm, *The Commonwealth of the Philippines* (New York and London), 1936; H. W. Krieger, *Peoples of the Philippines* (Washington), 1942; J. R. Hayden, *The Philippines: a Study in National Development* (New York), 1942; K. S. Latourette, *A Short History of the Far East*, 1946; and D. Bernstein, *The Philippine Story*, 1947.

Philippopolis, see PLODIV.
Philippos, kings of Macedonia. Of these the most famous were: 1. *Philip of Macedon* (382-336 B.C.). Upon the death of his brother, Philip obtained the gov. of Macedonia, first as guardian to his infant nephew Amyntas, but a few months later he assumed the title of king. Once firmly established on the throne, he resolved to obtain possession of the various Gk. cities. Demosthenes endeavoured to rouse the Athenians to their danger, but they did not adopt any rigorous efforts to check the progress of the Macedonian king. He subdued the Phocians and was rewarded

with the place of the latter in the Amphictyonic council (346 B.C.). The Athenians at length became thoroughly alarmed, and they resolved to oppose him. Through the influence of Demosthenes they formed an alliance with the Thebans, but their united army was defeated (Aug. 338) in the decisive battle of Cheronea, which put an end to the independence of Greece. Philip now determined on war with Persia, but in the midst of his preparations he was murdered by a youth named Pausanias. He was succeeded by Alexander the Great. See D. G. Hogarth, *Philip and Alexander of Macedon*, 1897. 2. Son of Demetrius II. (220-178 B.C.). During the first three years of his reign he conducted a war against the Ætolians, and afterwards engaged in two wars with the Romans. The first lasted from 215 B.C., when he concluded an alliance with Hannibal, to 205. The second commenced in 200, and was brought to an end by the defeat of Philip by the consul Flaminius at the battle of Cynoscephale in 197.

Philippsburg, tn. of Württemberg-Baden, Germany, 17 m. S.W. of Heidelberg. Pop. 3000.

Philippus, Marcus Julius, name of two Rom. emperors, father and son, of whom the former reigned A.D. 244-49. He was an Arabian by birth, and rose to high rank in the Rom. army. He obtained the empire by the assassination of the third M. Antoninus Gordianus. He was slain near Verona, either in battle against Decius (q.v.), or by his own soldiers. His son, whom he had proclaimed Augustus two years before, perished at the same time.

Phillips, or **Phillips**, **James Orchard**, see HALLIWELL-PHILLIPS.

Phillips, Ambrose (c. 1671-1749), Eng. poet, b. in Shropshire. He was educated at St. John's College, Cambridge, and his first printed work is a copy of Eng. verses in the collection pub. by that univ. in 1695. A performance was given at Drury Lane, in Feb. 1712, of his tragedy *The Distrait Mother*, which, although little more than a trans. of the *Andromaque* of Racine, was received with great applause, and long continued to be presented. A short time before, P.'s trans. of Sappho's *Hymn to Venus* had been printed in the *Spectator* (No. 223). But Pope and others contrived to bring him into ridicule, and the public were taught to call his poetry 'namby-pamby,' a name probably first bestowed by Henry Carew, the author of *Sally in our Alley* and *Chrononhotonthologos*. He produced two more tragedies, *The Briton* (1722) and *Humfrey, Duke of Gloucester* (1723). He next engaged in a periodical paper called *The Freethinker*, in which one of his associates was Dr. Boulter; he was almost certainly the chief contributor to *The Grumbler* (1715). See S. Johnson, *The Lives of the Poets* (vol. iv.), 1715 (new ed., vol. iii.), 1905.

Phillips, John (1676-1709), Eng. poet, b. at Bampton, Oxfordshire. His poem *The Splendid Shilling* (1703) is a happy imitation of Milton's style. The poem *Cyder* (1708) is his chief work, but that on the battle of Blenheim (1705) is of no great merit.

Philistia, in anct. geography, the name for a dist. on the lowlands of the Mediterranean coast, stretching from Jaffa to the desert S. of Gaza. It was occupied by the Philistines (q.v.). Gaza, Ashdod, Gath, Ashkelon, and Ekron were five centres of gov., each under its own prince.

Philistine, term of contempt or reproach used in England at the beginning of the seventeenth century. Later it became applied to persons whom the more enlightened or cultured considered beneath them in taste and intellect. Carlyle and Matthew Arnold in the eighteenth century used it frequently, having taken it from the Gers., with whom it denoted an impenetrable provincial.

Philistines, people inhabiting in biblical times the S. coast of Palestine, which became known as the Plain of Philistia (q.v., and see Joel iii. 4, etc.). They gave the name to the whole country of Palestine (q.v.). They are first mentioned (as Peloset or Palesati or Purasati) in the Egyptian records at Medinet Habu, as the chief tribe of the 'Peoples of the Sea,' who invaded Egypt, but were heavily defeated by the reigning Pharaoh, Rameses III., in 1191 B.C. They were able, however, a little later, to effect a settlement on the S.W. maritime plain of Canaan. They are often mentioned in the Bible (*Pelishtim*), where they are said to be of Hamitic stock (Gen. x. 14), but originated from Caphtor (Amos ix. 7). This is commonly supposed to denote Crete, but it is far from certain. The adjective 'uncircumcised,' so often applied in the Bible with contempt to the P., marks them off from their Semitic neighbours. Their language, too, was not Semitic (Neh. xiii. 24). Their chief god, Dagon, seems to have been taken over with the country they occupied, for he was a corn-deity well known in Syria and Palestine. The idea that he was a 'fish-god' is based on a mistaken etymology. The armour of the Philistine giant Goliath, described in 1 Sam. xvii., was of bronze and iron; the P. managed to maintain a monopoly of the importing and forging of iron until the reign of Saul (1 Sam. xiii. 19-22). Their power was broken by David. We know very little of Philistine culture, partly owing to the fact that their main cities continued to be occupied in subsequent ages, and have not yet been sufficiently excavated.

Phillimore, Sir Robert Joseph (1810-83), Eng. jurist and politician, b. in London. A writer on legal subjects, he left his *Commentaries on International Law*, a treatise on the law of domicile, and ed. the 9th ed. of Richard Burn's *Ecclesiastical Law*; he ed. also (1845) *Memoirs and Correspondence of George, Lord Lyttelton*. He was Liberal M.P. for Lavalstock and a friend of Gladstone. He ultimately became a judge of the probate div. of the high court.

Phillip, Arthur (1738-1814), Eng. naval officer and first governor of Australia, his name being perpetuated in Port Phillip Bay, Victoria; b. in London. As Capt. P., in 1787, he took out from England a small fleet carrying about 750 convicts

for Botany Bay, which he reached in Jan. 1788. But he considered the spot ill-suited for a settlement and selected a place to the N. of it which seemed to him to have the necessary qualifications, and, on Jan. 26, 1788, the Eng. flag was hoisted at Port Jackson, thus marking the beginning of the Brit. occupation of Australia. With convicts and their guards P. founded New S. Wales colony, the success of which he never doubted. His penal colony, however, had a difficult period of apprenticeship but, despite threatened famine and not a little vice and corruption among the very mixed settlers, the colony eventually thrived. It owed much to the sanguine temperament of P.; but his dream of establishing there a semi-feudal land system was doomed to disillusionment, for he found such a system could not succeed in Australia any better than in N. America. A national memorial on the wall of St. Mildred's Church, Broad Street, London, unveiled by the duke of Kent in 1932, commemorates the fact that P. laid the foundation of the colony which became the commonwealth of Australia.

Phillips, Edward (1630-c. 1696), Eng. poet, nephew of John Milton, b. in Westminster. His great work is the *Theatrum poetarum* (1675), a complete collection of ant. and contemporary poets, with observations upon them. The work contains criticisms far above the contemporary national taste, corrupted as the nation then was by the false and capricious refinements of the court of Charles II. Other works attributed to P. are *Enchiridion linguae latinae* (1684) and a poem on the coronation of James II.

Phillips, John (1631-1706), Eng. poet and author, brother of Edward P., b. at Bampton in Oxfordshire. His chief works, which are remarkable for licentious and coarse wit, pungent satire, and a generally controversial scurrility, are *A Satyr against Hypocrites* (1655); *Montielion, or the Prophetic Abnanack* (1660); *Maronides, or Virgil Travesty* (1673, which like some of his other works is in the style of *Hudibras*); *The Augustus Britannicus* (1697); and *The Vision of Mons* (1706), in addition to numerous trans. from Gk., Lat., and Fr. An early life of Milton, his uncle, is attributed by some to P. See W. Godwin, *The Lives of Edward and John Phillips*, 1815, and Helen Barber-Lane, *The Early Lives of Milton*, 1902.

Phillips, John (1800-74), one of the most distinguished of early geologists of England, b. at Marden, Wiltshire; his father married the sister of Wm. Smith, the 'father of English geology.' In whose care John, as a child, was placed after the premature loss of both his parents. For five years he attended Holt Spa School in Wiltshire, where he acquired a taste for classical learning. His uncle was by profession a civil and mining engineer, but devoted his time mostly to the preparation of maps of England and Eng. cos., and the nephew shared in the preparation of the maps, thereby acquiring a valuable preliminary training in geology. He was prof. of geology at King's College, London,

from 1834 to 1840, when he resigned to serve on the geological survey of Great Britain under De la Beche. In 1844 he became prof. of geology in Dublin Univ. and later a reader in geology at Oxford. In 1864 he was elected president of the Brit. Association. P. made a special study of liassic crustacea, coelitic saurians, and Wenlock shales. He wrote numerous works on geology, including *Illustrations of the Geology of Yorkshire* (1835); *Geology of Oxford and the Thames Valley* (1871); besides *A Geological Map of the British Isles* (1842) and *Memoirs of William Smith, the Father of English Geology* (1844).

Phillips, Stephen (1864-1915), Eng. poet and playwright, b. at Somerton, near Oxford, son of Stephen P., D.D., precentor of Peterborough. He was educated at Stratford-on-Avon Grammar School and at Oundle. After studying for the civil service he played in F. R. Benson's Shakespearian companies for six years, then became an army tutor at Wolfham and Needham's, and finally devoted himself to literature. Of poetry he pub. *Primavera* (1890); *Bremus* (1894); and some other vols., that of 1897 being crowned by the Academy. He then took to writing verse-plays for London theatres: *Paolo and Francesca* (1899); *Ulysses* (1902); *The Sin of David* (1904); *Nero* (1906); *The King* (1912). From 1913 he was editor of the *Poetry Review*. His best play to be performed was *Armageddon* (1915). Pub. *Panama and other Poems* (1915). Completed *Harold*, a verse play, just before his death.

Phillips, Walter Joseph (b. 1884), Canadian artist of Brit. descent, b. at Barton-on-Humber, England, and educated in Birmingham. He first exhibited at the Royal Academy in 1913, and in the same year emigrated to Canada, settling in Winnipeg. Here he began the art of colour-woodcut for which he has become famous, galleries in Europe and America showing examples of these, and pictures, etchings, and water colours. He has an exquisite sense of colour and a fine originality of design and pattern. He has pub. two portfolios of his woodcuts, and also *The Technique of Colour Woodcut* (1927).

Phillips, Wendell (1811-84), Amer. reformer and orator, b. in Boston. He gave up a legal practice to devote his time to the abolition of slavery, and he was regarded as the prime orator of the movement. In 1840 he was sent by Massachusetts to the World's Anti-Slavery Convention. His *Speeches, Lectures, and Letters* were pub. at Boston (1864 and 1892). See lives by G. L. Austin, 1888, and C. Martin, 1890.

Phillipsburg, tn. in Warren co., New Jersey, U.S.A. It manufs. silk and machinery, and has iron foundries. Pop. 15,000.

Phillipps, greyish translucent mineral, the primary form of which is a right rhombic prism. It consists chiefly of silica and alumina.

Phillpotts, Eden (b. 1862), Eng. novelist, b. at Mount Aboe, India; eldest son of Capt. Henry P. (15th Native Infantry), political

agent for the states of Harrowice, Rajputana. Educated at Plymouth, he became a clerk in the Sun Fire Insurance Office, 1880-90; and then, after studying for a time for the stage, adopted literature as a profession. In his novels P. gives a vivid and often terrible picture of Devonshire life. His pubs. include *Lying Prophets* (1896); *The Human Boy* (1899); *The Good Red Earth* (1901, reissued as *Johnny Nightingale*, 1904); *My Devon Year* (1903); *The American Prisoner* (1901); *The Secret Woman* (1905, dramatised 1912, but banned by censor); *Portreere* (1906); *The Folk Afield* (1907); *The Mother* (1908, dramatised 1913); *Widcombe Fair* (1913); *The Judge's Chair* (1914); *The Farmer's Wife* (play, 1917); *A Shadow Passes* (1918); *The Bronze Venus* (1921); *Redcliff* (1924); *Yellow Sands* (play, with Adelaide P., 1926); *Buy a Broom* (play, 1929); *Tryphena* (1929); *Essays in Little* (1931); *A Shadow Passes* (1933); *Portrait of a Gentleman* (1934); *Woodnymph* (1936); *Portrait of a Scoundrel* (1938); *Golderness* (1940); and *Pilgrims of the Night* (1942). The novels of P. are mostly of Devonian life and character and the mood atmosphere in them is detailed and true. They have a considerable vogue, though in point of success he reached the zenith of his career with the play *The Farmer's Wife*, a somewhat old-fashioned comedy with a simple plot and homely scenes which enjoyed a phenomenal run in London and in the provinces.

Philo, Judæus, or Philo (Philon) the Jew (b. c. 25 to 20 B.C.), member of a distinguished sacerdotal family. He was a native of Alexandria, and it is possible that he belonged to the sect of the Pharisees. He was eminent for his learning and eloquence, having been educated not only in the subjects usually studied by a Jew in his condition, but also in the Gk. philosophies, of which he had an extensive knowledge. He was especially conversant with Plato, and it is for his attempt at a reconciliation of the Platonic philosophy with the Mosaic revelation that his name is especially famous. The Logos doctrine owes its origin to P., and the influence of his school is visible in many of the N.T. writings, notably in the fourth gospel and in the epistle to the Hebrews. A more direct product of his school, however, is the apocryphal Book of Wisdom. There are eds. of Philo's works by T. Mangey (1742), C. E. Richter (1828-30), L. Cohn and I. Wendland (1896-1930); also monographs by C. Siegfried, 1875; J. Reville, 1881; J. Drummond, 1888; H. Windisch, 1909; E. Bréhier (2nd ed.), 1925; H. Willms, 1935; and E. R. Goodenough, *An Introduction to Philo Judæus*, 1940.

Philo, Quintus Publilius, Rom. general. During his consulship (339 B.C.) he defeated the Latins, and was appointed in the same year dictator, when he passed the *Leges Publilianæ* according to which one consul must be a plebeian. During his second consulship (327) he carried on war in S. Italy, and during his third (320) he fought against the Samnites.

Philoteles, in Gk. legend, was the

armour-bearer of Hercules, from whom he inherited his bow and arrows. At the beginning of the Trojan war P. was left behind at Lemnos, but Helenus, having prophesied ten years later that Troy could only be taken by Hercules' arrows, Ulysses returned for him. See *Sophocles' Philoctetes*.

Philodendron, ornamental dwarf or climbing plant with oblong, heart-, or arrow-shaped leaves. Among the chief species cultivated in Britain are *P. andræanum* and *P. gloriosum*, both climbers, and *P. verticillatum*, a dwarf plant.

Philology is the branch of knowledge which is concerned with the origin, growth, and relation of various languages. In this respect it is synonymous with 'linguistics' (q.v.), and has a wide range of meaning. In a strict sense, P. may indicate the study of written documents and literary works, and particularly of their language, its aim being to obtain from all these documents all possible information regarding the development of the language in question, and of its relationship with other languages: this special field is known as comparative P.

Gk. and Lat. P. was developed to a high degree of excellence in the sixteenth to eighteenth centuries. Semitic scholars followed the same methods in dealing with the Semitic languages then known, such as Heb., Arabic, Ethiopic. However, until about 150 years ago P. as an exact science was still in its infancy. During the second half of the eighteenth century Sanskrit (q.v.) began for the first time to attract the attention of European scholars: the Fr. Jesuit Couderoux, in 1767, and Sir Wm. Jones, in 1786, pointed out certain resemblances between Sanskrit and some European languages, especially anct. Gk. and Lat. At the time it was no more than a brilliant conjecture, but in 1816 the Ger. prof. Franz Bopp pub. a comparative grammar of the Sanskrit, Gk., Lat., Persian, and Ger. languages; with it comparative P. may be said to have begun.

A century ago, 'when the archeology of the Near and Middle East was still in its swaddling clothes,' there were already good dictionaries and grammars of various Indo-European, Semitic, and other languages. After the discovery and decipherment of the numerous Egyptian, Assyro-Babylonian, Hittite, Phœnician, S. Arabian, and other inscriptions, philologists began to apply scientific methods in the compilation of grammars and dictionaries of the new tongues. To-day many languages long since extinct, belonging to different linguistic families (q.v.), are nearly as well understood by competent scholars as are half Gk., Lat., or anct. Heb. Others, however, such as Hurrian, are still little known because there are not sufficient written documents. See further under: LANGUAGE; LANGUAGE, ORIGIN OF; LANGUAGES, CLASSIFICATION OF; LINGUISTIC FAMILIES; LINGUISTIC SCIENCE; also INDO-EUROPEAN LANGUAGES.

Philomela, in Gk. mythology, was the daughter of Pandion, king of Athens.

She was dishonoured by Terens, king of Thrace, the husband of her sister, Procne, and had her tongue cut out so that she could not reveal the fact. But P. wove words into cloth, and Procne, on discovering the truth, slew her son Itys and served him up as a dish before the king. Whereupon Terens pursued the sisters, who were changed, one into a swallow, and the other a nightingale, while the king became a hoopoe. Hence in poetical speech the nightingale is often called P.

Philomena, St., young woman whose cult had much vogue in the nineteenth century, after the discovery in 1802 of relics, in the catacomb of St. Priscilla, with a broken tablet inscribed *Filumena*, *Paetecum*, leading to the belief that the body was that of an unknown martyr. It would seem, however, that the church of St. Praxedis in Rome already contained the relics of the real St. P.

Philon the Jew, see PHILO, JEWERS.

Philopomen (252-182 B.C.). Gk statesman and patriot, b. at Megalopolis, Arcadia. He defended his native city against the Spartans (222), and, joining the Macedonian king, Antigonus, defeated the enemy at Sellasia (221). In 210 he was appointed general of the Achaean horse, and in 204 was raised to the position of *strategos*. After his victory over the Spartans at Mantinea (208) he was proclaimed liberator of Greece, and in 192 again defeated the Spartan army under Nabis. In 182 he was taken prisoner by the Messenians and given a cup of poison.

Philoxenus (fl. 316 B.C.), Eretrian painter who was remarkable for the rapidity with which he worked. His greatest work was a picture of the battle between Alexander and Darius, painted by order of Cassander, king of Macedon.

Philosopher's Stone, see under ALCHEMY.

Philosophy, term of which the meaning has in the course of centuries undergone considerable modifications. Pythagoras is reputed to have been the first to use it, replying to Leon's question as to his vocation that he was a 'philosopher,' that is, a lover of wisdom (*philos* and *sophia*). No kind of knowledge was in those early days outside the scope of P., which comprehended the whole range of human interests. This is seen in the Stoic definition of P. as the endeavour after theoretical and practical perfection in the depths of logic, physics, and ethics. Plato, in the *Euthydemus*, declares that P. is concerned with the ideal alone, and is identical with wisdom, whilst Aristotle uses the word sometimes to embrace all science, and sometimes as equivalent to the science of being (ontology). In the days when it was possible for the great minds of the world to be pre-eminently not only in one or two but in most of the dept's. of science, the philosopher could formulate his system of P. from his own first-hand knowledge and experience. All knowledge was thus taken by P. to be her prov., and a philosopher, so called, was very often an expert in the various sciences. Such a state of things was only possible while science was in a very rudimentary condition, and with the growth of specialised knowledge P.

could no longer include, though it still retained the claim to transcend in importance, all knowledge. In this sense the scholastics and neo-scholastics define P. as 'the knowledge of things through their highest (i.e. most universal and independent) causes.'

Before the more modern definitions of P. are mentioned, a brief answer may be given to the old query, 'What is the good of P.?' From the time of Aristophanes onwards the philosopher has been represented as unpractical, immersed in useless and chimerical speculations. But Aristotle remarked, in order to prove that P. is vain and illusory we are compelled to philosophise. The sceptic is as much a philosopher as the idealist. There are experts in the special sciences who sometimes decry P., yet tread upon philosophical ground while pursuing their most abstruse inquiries. Mathematics is ultimately concerned with the questions of time and space, physics with causality and substance, art with beauty, religion with virtue, etc. P. is thus seen to be a necessity of human nature; the pursuit of speculative truth has always engaged men's minds, although there have ever been those to say that the end was unattainable. It is not so much the end as the pursuit that is important. An understanding of what is meant by the term P. in present-day usage is a necessity to a thorough study thereof, but unfortunately this is by no means an easy matter. Hardly any two writers are agreed as to the definition and boundaries of P., and the word has different connotations in different countries. Kant defined philosophical knowledge as knowledge through conceptions, as such; Horhart defined P. as the working out of concepts, and divided it into three dept's., logic, metaphysics, and aesthetics (including ethics). Comte and Spencer also regarded P. as the unification and classification of the various sciences with a view to merely material ends. In the Eng. language, until very recently, P. meant almost anything, as evidenced by the term 'natural philosophy,' used by physicists. When properly used in the wider sense, P. may be taken to include logic, ethics, aesthetics, metaphysics, ontology, cosmology, and psychology; political economy and the 'philosophies' of law and hist. are often included. All these subjects are closely related to P., although not included in the narrower use of the word.

The most noteworthy advance in modern times has been that of psychology, which is now generally studied separately from P., and which, it is claimed by some, should be treated entirely as a physical science. The bearing on psychological investigations of the theory of knowledge, and the peculiar characteristics of 'mind' as a study, render it desirable for psychology to be retained as a dept. of P., although distinct from and subordinate to the higher branches. Logic, ethics, and aesthetics, whilst also forming part of P., differ from the other dept's. in being 'normative' sciences, having reference to

the 'norms,' or standards, respectively of truth, virtue, and beauty. For the purposes of this general outline of the progress of philosophical thought, P. will be taken to include epistemology, or the theory of knowledge, metaphysics, and ontology. The ultimate task of P. is to show the interconnection of the sciences and their ramifications as part of an organic whole, which constitutes the totality of knowledge. Some idea of the steps in the fulfilling of this task may be gained from a knowledge not only of the philosophers themselves, but of their indebtedness to and connection with one another.

The beginnings of P. are as a rule attributed to the Gks., but the Indian ideas of the sixth century B.C. and later form an interesting parallel philosophic development. The Upanishads, whose main thesis is the monistic idea of the one true Absolute (Brahman or Paramathman), preceded the six philosophical systems. These are the *Nyaya*, the *Vaishnava*, the *Sāṅkhya*, the *Yoga*, the *Mīmāṃsā*, and the *Vedānta*; they all are based upon a Monism, expressed in a more or less poetical manner. In contrast to these declining oriental civilisations, the culture of the Gks. was only in process of formation.

Gk. P. may be divided into three sections: a physical or cosmological period, dealing with questions of being (c. 600-450 B.C.); a humanistic or ethical period, dealing with the ethical and social relations of man (450-400 B.C.); and a systematic period, during which all human problems were first connected in thought into a whole (400-300 B.C.). The problem of the early Gk. philosophers was to find the ultimate form of the objects of external perception. Thales thought that water was the source of all things; Anaximenes that it was air; and Anaximander, chaos. The Pythagorean P. had for its general principle number: the organisation of the universe in its various relations is a harmonious system of numbers. The Eleatic school, of which Parmenides was the real head, asserted that there was in reality no change or movement in the universe. The riddles of movement of Zeno (Achilles and the tortoise, etc.) had much influence on the conclusions of the Eleatic school. These conclusions were challenged by Heraclitus, who taught that 'everything is in a state of flux' (*panta rhei*), and that the permanence of things is only apparent. Empedocles attempted to combine the Eleatic principle of 'being' with the 'becoming' of Heraclitus. Democritus, the main author of the atomist theory, was the next noteworthy philosopher of Greece; he may be said to have laid the foundations of modern physics and cognate sciences, and is the earliest philosopher who attempted to give a scientific explanation of the world. Anaxagoras was the last philosopher of the early period; and his doctrine of *νοῦς* (mind, as the omnipotent, omniscient, and harmonising power is the first teleological explanation of the universe. The Sophists were the first philosophers

of the second Grecian period, although they were in reality a professional class who came forward to meet the growing demand in Greece for knowledge. The founder of the school is usually considered to be Protagoras, whose fundamental thesis consisted, in modern language, of the denial of all objectivity, and the restriction of knowledge to the impressions of the individual. His famous dictum was 'Man is the measure of all things,' and he may be called the first of the Individualists. Other prominent names among the Sophists are Gorgias, Leontini, Prodicus, Hippas, Polus, Thrasy-machus, etc. The Sophists were generally teachers of rhetoric and eloquence, and during this period P. underwent a change in character. Problems of an ethical nature were discussed more, and, as a result of the prevalent doubts of the existence of any universally valid truth, scepticism (g.r.) was the prevailing note. Hence the title 'Sophist' is still used in a disparaging sense, but there is no doubt that they did some good in fostering culture and promoting intellectual activity. The philosopher who was instrumental in refuting the arguments of the Sophists and rehabilitating P. was Socrates. Of his P. we possess no record written by himself, as he never left any; his life and P., as revealed in the *Dialogues* of Plato, are inseparable. He based conduct on knowledge; to know oneself is the sum of all P. and the only pursuit worthy of man. He founded no special school of P., though he gave the starting-point to sev. lines of thought. The minor or imperfect Socratic schools, as they are termed, are three: the Megarian, the Cyrenaic, and the Cynic. The originator of the first was Euclid of Megara, and his system combined Socratic ethics with the 'One-being' doctrine of Parmenides. The Cyrenaic school, founded by Aristippus, was the forerunner of the Epicureans, and held that pleasure was the only good, though not such pleasure as would be followed by pain. The sect of the Cynics was founded by Antisthenes, who declared virtue to be the only thing worth living for; virtue was, however, defined as abstinence and asceticism. Diogenes of Sinope is the famous example of a Cynic philosopher. The last epoch in Gk. P. is a landmark in the hist. of human thought. In the two great names of this period, Plato and Aristotle, the thought of all preceding ages reached its culmination. In their union and contrast they form the two poles of thought around which the human search for truth still revolves. Plato is occupied mainly with an inquiry as to the necessary and universal element in experience; he represents the synthesis of pre-Socratism and of Socratism. We are indebted to Plato for two great truths: that, in order direct human knowledge aright, reason must be the starting-point and that all human thinking is accomplished by means of universal concepts. The doctrine of universal ideas has had a great influence on the hist. of P., and is now an important factor in every philosophical system. Aristotle may be called

the founder of empiricism in the auct. world. Plato placed P. in an idealistic antithesis to actuality, and a more realistic conception of things was supplied by Aristotle. There are two essential elements to be considered in a rational examination of the world, the *ἔναν*, or matter, and the form which may be given to it by human intelligence. Aristotle was called the philosopher by medieval schoolmen, and his work certainly far surpasses, both in character and amount, that of his predecessors. His logical treatises, his ethics, and his psychology served for ages as standard treatises on the various dept's. of P.

During the Rom. rule there were, from a philosophical point of view, two main periods, a moral and a religious. The three main systems of the first period are Stoicism, Epicureanism, and a Scepticism. The first teaches that happiness is to be found not in outward things, but in power over 'all thoughts, all passions, all desires.' Epicureanism declares the supreme good to be personal pleasure, consisting not in self-indulgence, but in tranquillity and peace of mind. Total submission is advocated by Scepticism (q.v.), which declares definite knowledge unattainable. The chief names in Stoicism are Zeno, the founder, Panætius, Posidonius, Seneca, Epictetus, and Marcus Aurelius; in Epicureanism, Epicurus, Metrodorus, Hermarchus, Polystratus, and Apollodorus may be mentioned; Pyrrho of Elis founded the Sceptical school, of which Arcesilaus and Carneades were the prin. adherents. The religious P. of the Rom. period is known as neo-Platonism. The germ of this teaching is found in the writings of Philo, but the title of founder of neo-Platonism properly belongs to Plotinus, a pupil of Ammonius Saccas. Neo-Platonism is a religious P. with strongly marked mystical tendencies and has more in common with religion than with P. proper. The Gnostics and the Christian Fathers were representatives of faiths which formed the transition from auct. to medieval P. The chief of the Gnostics were Basilides, Carpocrates, Valentinus (Alexandrian Gnostic), and Mnander, Saturninus, Tatian, and Bardesanes (Syrian Gnostics); among the Fathers may be mentioned Justin Martyr, Athenagoras, Theophilus, Clement of Alexandria, Origen, Athanasius, and St. Augustine. The latter based their P. on Platonic Illuminism as the most 'spiritual' of the Gk. P's., but they had some trouble with those elements of Plato's system which seemed to conflict with Christian dogma, e.g. the eternal existence of matter. It was St. Augustine who really 'christened' Platonism.

The first representative of medieval or scholastic P. was John Scotus Erigena. The great problem over which the battles of the Schoolmen were waged was Nominalism *versus* Realism. The Nominalists, who followed Aristotle, maintained that universal notions were mere empty abstractions of the mind, having no objective reality. The Realists, following Plato's teaching, contended that universal notions

had a real existence prior to the concrete things which embodied them. An intermediate theory, which sought to unite the two systems, was called Conceptualism, which was finally superseded by the moderate realism of the Thomists. The chief figures among the earlier scholastics are Roscelin, the nominalist; Abelard, the dialectician who foreshadows the moderate realism mentioned above; Anselm, his adversary, a pioneer in medieval psychology; and William of Champeaux, the extreme realist. Albertus Magnus, 'the Universal Doctor,' introduces the urge to thorough-going synthesis, which found its perfection in the writings of St. Thomas Aquinas and was continued by the Thomists. In contradistinction to these a Franciscan school, headed by Alexander of Hales and St. Bonaventure, continued the 'mystic' (neo-Platonic) tendencies of the Victorine school of the twelfth century. A veneer of Aristotelian logic was given to their doctrines by Duns Scotus, after whom the Scotists are named. Thereafter came the slow decline of Scholasticism, which, by the Reformation, had ceased to represent any vital force in the world of P. During the period of the Renaissance, the intellectual movement which marked the transition from the Middle Ages to the modern world, nearly every system of auct. P. was revived, and the resulting intellectual activity found expression in the writings of the philosophers of the 'transition period.' Chief among these was Giordano Bruno, the It., whose system is a pantheism which had much influence on Spinoza. Jakob Boehme and Montaigne represent respectively mystical theosophy and scepticism, whilst Bacon and Hobbes showed the defects of the existing methods of research and inquiry, the latter emphasising the importance in science of deduction, to which Bacon did not ascribe any importance.

Modern P. is generally regarded as commencing with Descartes. The first phase of modern thought is scientific Rationalism, which appealed to the reason, by which such mighty results were being obtained in natural science. From Descartes to Leibniz there is a period of metaphysical systems which have a close connection with science. This Rationalism, however, assumed a harsh, narrow aspect. Reason was deified, and represented as the all in all, and Deism took the place of religion. The gradual undermining of Rationalism was due to the efforts of the Empiricist school, which argued that experience is the source of all knowledge. Scepticism succeeded Empiricism, but was itself discredited by the new movement, started by Rousseau, Lessing, and Herder, which grew into what is known as Ger. Idealism. This in its turn has been supplemented by the theories of Schopenhauer, Spencer, and others. The chief men who have been instrumental in bringing about this progress are as follows: Descartes's system was idealistic and dualistic; the world falls into two completely separated realms, the one of body and the other of mind.

Behind this dualism, however, is the conception of deity, the one perfect substance in which both realms meet. The manner in which this union is brought about was not satisfactorily explained by the parallelism of Descartes. Geulinx attempted to overcome the difficulty by his theory of Occasionalism, which attributes all movements, both mental and physical, directly to God; Malebranche is closely connected with this position. Hobbes held that the end of P. was social, and that theology and transcendentalism did not come within its sphere. Spinoza declared the unity of all things in God, mind and matter being equal, both being attributes of the infinite, eternal, and all-comprehending substance which he calls God. Leibniz was the chief representative of Pluralism in metaphysics, regarding individuation as an irrefragable truth. His system was in all respects the logical antithesis of Spinoza's, and made an immediate and widely extended impression on the culture of Europe, which it dominated until the time of Kant. Wolff was the first follower of Leibniz who erected an independent system on his principles; he attempted to combine the teaching of Leibniz with the older Aristotelian doctrines of the schools. Among the pupils of Wolff who influenced Kant were Baumgarten and Crusius. Locke may be called one of the founders of modern psychology; his P. is a study of ideas. The influence of his writings has been very great on the subsequent course of philosophic thought, and his principles were developed in the hands of Berkeley, Hume, Reid, and the so-called Scotch psychological school, and afterwards in those of the Fr. sensationalist and materialist school, including such names as Condillac, Helvétius, Diderot, and D'Holbach.

Kant was the pioneer of a line of thought leading again to those wider issues as to the meaning and constitution of reality treated of by Plato and Aristotle. He has given the most thorough analysis of the human mind that has ever been offered. He created a new dualism between the phenomenon and the noumenon. The development of Idealism was carried on by Fichte and Schelling. The line of thought pursued by Kant, Fichte, and Schelling culminates in Hegel. The diverse elements of thought, subject and object, individualism and pantheism, which previous Ps. only partially reconciled, are now taken up and fused into one system. The two elements of knowledge which Kant had left unreconciled, and which Fichte and Schelling harmonised only by suppressing one of the sides, were brought into a synthesis. The ultimate principle of all knowledge is the unity of consciousness. Hegel's system must be regarded as the culmination of Ger. Idealism. 'Mountains of dust and rubble and millions of graves testify to-day to the fatal character of such one-sided historical thinking as that of Hegel' (Douglas Jerrold). Of the philosophers since Hegel, Schopenhauer was a pessimist who regarded life as

essentially evil; his chief tenet is that the inner-essence of man's nature is will. The Positivism of Auguste Comte is in reality a denial of the utility of P., save as a classification of the different sciences. In its later form Humanism as a whole was worshipped as the mediator between the outer world and man. The Utilitarianism of the Benthams and J. S. Mill, though based on an individualistic and hedonistic theory, was at bottom social in its nature. The theory known as psycho-physical parallelism was taught by Fechner and Paulsen. The doctrine of evolution inspired by the P. of Spencer may be described as the creed of the Unknowable. Among other modern systems of P. that of Lotze is teleological in nature, combining the monadology of Leibniz with the pantheism of Spinoza, and has had much influence on Amor, thinkers.

It may be said that modern P. is divided into two main sections, of which the one maintains and the other denies that matter and spirit can be reconciled in a manner comprehensible to the human reason. On the latter side are the Positivist, the Kantian, the theological Agnostic, and all the allied schools, whilst on the former side are the Theist, the Idealist, the Spiritualist, and their followers and allies.

One of the chief tendencies of present-day P. is to seek to establish a closer relationship between P. and the sciences. But in order to complete this movement, it is necessary to define more clearly just where the physical conception of the universe stops and the philosophical perception of the universe as a whole begins. Students to-day already recognise that the physical conception of the universe does not allow for the degree that time relations as well as space relations affect it. Indeed physical science is not to be regarded as an attempted interpretation of reality, but only as a means of conducting tests and investigations to support theories of reality. Conscious behaviour and life elude the physical scientist, as was the case with Newton, and a perception of the universe is dependent on life and consciousness. For that very reason different scientific interpretations reveal inconsistencies, and it is just these variations that philosophy must endeavour to interpret and bring to agreement. Thus P. confines itself to actual experience, including not only present, but past and future, in any aspect which may reveal some new postulation in its endeavours to interpret reality, and this in part explains the growing return to realism as opposed to a materialistic theory founded on physical interpretations. A valuable contribution to the philosophical literature of the present time has been made by Prof. S. Alexander. It may perhaps be described as the first system of P. yet propounded by a Brit. philosopher. Alexander declares 'that space and time are real, and that the physical world arises from space and time. He denies that idealism can provide the base upon which reality rests, holding that ideas are merely abstractions from reality, and that

with a certain complex element in physical structure life is evolved, or, as he puts it, is 'emergent.' He makes no attempt to explain life away as an elaborate system of mechanism. Similarly a further complex development in the physical structure produces mind. Beside the work of Alexander, the work of J. S. Haldane deserves mention. Haldane thinks that the universe as it is assumed to be in physical science is only an idealised world, while the real universe is the spiritual universe, in which spiritual values count for everything. The group of workers who are in agreement with Haldane include Bradley and Bosanquet of Great Britain, Royce of America, Croce and Gentile of Italy, and Volkelt of Germany. Opposed to their teaching is a school which includes W. James, Dewey, and Schiller, who, from a pragmatic standpoint, propound that experience in conduct gives us 'right,' while experience in thought is 'truth.' They demand that the practical consequences of an idea should be its true measure of value, involving a criticism of a monistic universe, and their demand imports a belief in pluralism (*q.v.*). In America there is a tendency to refute the Idealism of Kant as developed by Hegel, and Bertrand Russell and G. E. Moore have written from that standpoint. In France the P. of Bergson (*q.v.*) has had a wide following. He is opposed to absolutism, and offers in support of his criticism his doctrine of change as the answer to the riddles of the philosophical world. Croce and James in many respects subscribe to this theory. Bergson's attitude towards evolution is expressed as the universe being a mind functioning both theoretically and practically; the practical operations produce the materialistic world, while the theoretical manifestations result in the spiritual world. Prominent among Ger. philosophers is Wundt, who died in 1921. His theory is that the body is part of an experience of which the soul is subjective. He proclaims the 'will to believe,' and up to this point is supported by W. James. Impulse will is imputed to all organisms, and activity is will, and the highest will he calls God. Fr. P. reveals a decided sociological trend, and is conducted rather by way of attempts to solve separate problems than the formulation of any complete system. It may be that the earlier mathematical studies of some of the leading philosophers like Cournot and Renouvier and the scientific investigations of Bergson and Le Roy produced a more precise method of inquiry, and modern Fr. thought appears to withdraw from the consideration of individualistic systems, declaring that reality is too rich and complex to support that contention. P. is said, is a manifestation of life itself which blossoms to self-consciousness through grades of increasing harmony.

In France, after 1944, existentialism (*q.v.*) gained much attention, its chief exponent being Jean Paul Sartre. Based on his view that 'all human activities are equivalent, all are destined by principle to

defeat,' it conceives of the absolute inanity of existence and negation of all creation, and offers no dogmatic solutions to questions of ultimate origins and destinies. It is not entirely a novel P., and its distinctive features are borrowed from Kierkegaard (*q.v.*), amongst them that God and exceptional individuals are above moral categories, and that subjectivity is truth, i.e. 'consciousness creates out of itself what is true.' Karl Jaspers (*q.v.*) upholds the existentialist contrast between mere existence and significant existing, but stresses the experience of another person as a separate other person. Whereas Martin Heidegger (*q.v.*), whom Sartre follows (but who denies any connection with existentialism), holds that there is no other, that existence is somehow born from nothing, and also that the possibility of a God and of man's dignity reside in being as such.

The relationship between P. and sociology has a particular interest in these days when the study of social questions appeals to a rapidly growing number of students. Bosanquet suggests that the philosopher reads in society the wider expression of what individual man really is. He investigates the social whole in order to discover in its progress what the mind of society really is and what are its powers of self-assertion or self-offacement in human and natural environment. The state is merely an expression of certain needs and ambitions of man. Bosanquet's theory is based upon Plato's assertion that politics was a science, and that political forms correspond to types of mind, and, further, that the central inspiration of all science is good, and, finally, in a glorious climax, that no one who has not comprehended the connection that links the order of the universe and its influence upon society was competent to be a ruler of men.

An Aristotelian reaction has shown itself in the neo-Scholastic movement among Rom. Catholic philosophers, fostered by the work of Cardinal Mercier at Louvain, and the study of the works of Aquinas imposed by recent popes upon seminary students. The chief leaders of the movement are Dr. Grabmann of Munich, J. Maritain in France, and F. Aveling, M. C. d'Arcy, P. Coffey, and others in Great Britain. The current interest in psychology (*q.v.*) and its ever-widening appeal to a class of student with little or no previous acquaintance with P. as a science call for a word of warning. There is a tendency to include all questions associated with the study of the mind under the heading psychology. In most cases the classification is wholly unjustified, and it is only too easy for the student to examine some question which is purely philosophical under the delusion that he is studying psychology. Psychology knows only causes and effects of mental life; it has nothing to do with ideals, values, purposes, and ends except as mere facts. P. is an attempt to get at the deeper reality of things; the significance of human life, the nature of the soul, human destiny, immortality, and

God are purely philosophical problems. Psychology examines phenomena, P. seeks to explain.

The large number of philosophical works that followed the break-up of the Hegelian school were alike in that they consist, not in any enthusiasm in speculation for its own sake, but rather in the desire to see how others have speculated, or, in other words, in the hist. of P. Thus many writers of a philosophical bent have acquired a reputation exclusively for their criticisms rather than for any system of P. Among independent philosophers who are better known for their chapters on the hist. of P. are Zeller, Frautl, Sigwart, and also Kuno Fischer, the last-named being no mean constructive philosopher. Even such philosophers as Ernst Reinhold and Chalybäus are known as historians of P. more widely than as expositors of systems of P.; while Trendelenburg's *History of the Doctrine of Categories* is read in Germany far more than his *Logical Investigations*. Indeed it is remarked by Erdmann that this preponderance of the historical element is seen even in the speculations themselves, especially in the form of critical discussions contained in historical introductions. The only exceptions would appear to be Lotze and Weiss; for such well-known works as Hillebrandt's *Organon of the Philosophical Idea* and Wirth's *Idea of the Godhead* are really sketches of the hist. of P. In this connection it is pointed out by Erdmann that Christ has received many compliments for his criticism of the Hegelian P. but that as regards his theory of distinguishing activity he seems to stand alone; yet he does not think that this marked preference is any indication of philosophical decrepitude and sees an almost conclusive parallel in the effect on the study of the law of the brilliant historical writings of Savigny. There is clearly much gain in having the hist. of P. presented in a philosophical manner; for, just as the study of legal hist. paved the way ultimately for increased study of the law for its own sake, so the study of the hist. of P. may give an impetus to a wider study of P. See also COSMOGONY; ETHICS; LAW; LOGIC; MIND; POLITICAL ECONOMY; POLITICS; PSYCHOLOGY; SOCIAL PHILOSOPHY, etc.

See A. H. Ritter and L. Preller, *Historia Philosophiae Graeco-Romanae*, 1888; T. Gomperz, *A History of Ancient Philosophy* (trans.), 1912; H. Cohen, *System der Philosophie Logik*, 1902; B. Russell, *Problems of Philosophy*, 1912, and *History of Western Philosophy*, 1948; H. Hoffding, *Brief History of Modern Philosophy* (trans. by C. F. Sanders), 1912; G. C. W. Webb, *History of Philosophy*, 1915; W. Windelband, *History of Philosophy* (trans.), 1910; C. E. M. Joad, *Mind and Matter*, 1920, *Guide to Philosophy*, 1936, and *Philosophy of Our Times*, 1940; H. Bergson, *Mind Energy*, 1920; J. MacTaggart, *Nature of Existence*, 1921; J. E. Erdmann, *A History of Philosophy* (trans.), 1921; L. Roussier, *Philosophy and the New Sciences*, 1922; B. Bosanquet, *Meetings of Extremes in Contemporary Philosophy*,

1924; J. Seth, *English Philosophers and Schools of Philosophy*, 1925; I. Merleier, *Manual of Modern Scholastic Philosophy* (trans.), 1926; Sir A. Eddington, *The Nature of the Physical World*, 1928; E. Zeller, *Outlines of the History of Greek Philosophy* (13th ed.), 1931; M. de Wulf, *History of Medieval Philosophy*, 1926, 1935; J. Maritain, *An Introduction to Philosophy*, 1931, and *Three Reformers*, 1948; A. N. Whitehead, *Adventures of Ideas*, 1933; L. Barker, *Greek Political Theory* (3rd ed.), 1947; and H. Hawn, *Philosophy for Pleasure*, 1949.

See also the various philosophers mentioned in this article, and the various systems particularly: of the former, ARISTOTLE; BACON; COMTE; DESCARTES; FICHTE; HEGEL; HERBERT; HUME; KANT; LEWES; LOCKE; LOUIE; PLATO; SPENCER; SPINOZA; and of the latter, DEISM; IDEALISM; POSITIVISM; MATERIALISM; OPTIMISM; PESSIMISM; THEISM; TRANSCENDENTALISM, etc.

Philosophy, Social, see SOCIAL PHILOSOPHY.

Philostatus (c. A.D. 170-250), Gk. sophist and rhetorician of Lemnos. He settled in Rome at the time of Severus and wrote *Lives of the Sophists*, *Life of Apollonius of Tyana*, *Heracles*, and *Epistles*. The standard ed. of his works is by Kayser (1849). There is an Eng. trans. by E. Berwick (1809). P. the younger, a grandson of the preceding, wrote a work entitled *Imagines* (on paintings).

Philotas (d. 330 B.C.), Macedonian soldier, son of Parmenion, one of the generals of Alexander the Great. While P. was serving in Media he was accused of treason, and his action having implicated Parmenion, father and son were executed.

Philozenus (135-350 B.C.), Gk. dithyrambic poet, b. at Cythera. He spent part of his life at Syracuse, where he lived at the court of Denis the Ancient. Only a few fragments of his poems have come down to us.

Phips, or Phipps, Sir William (1651-1695), first royal governor of Massachusetts, b. at Penmaenquid in Maine. In 1687 he rescued treasure to the value of £300,000 from a Sp. wreck, and was rewarded for his services with a knighthood and appointed a sheriff of New England. He captured Port Royal in 1690, but failed in his attack on Quebec (1691). He was appointed governor of Massachusetts in 1692. See life by Bowen in Sparks's *American Biography*, 1834-37.

Phiz, see BROWNIE, HAMBOT KNIGHT.

Phlebitis, inflammation of a vein. It is generally caused by the extension of inflammatory processes from neighbouring tissues, and results in the formation of a thrombus or clot in the course of the vein. This clotting is attended with particular danger, as if it becomes detached from any cause, septic emboli or masses of infected fibrin are carried away in the bloodstream and may lodge in an important organ. Here they may cause dangerous inflammation through an infectious process, or by obstructing the circulation may increase the blood pressure

locally to a disastrous extent. Thus an embolus may reach the brain and cause sufficient vascular disturbance in the cerebral region to produce paralysis and death, or it may lodge in the lung and cause a pulmonary embolism. The symptoms of P. are pain, swelling, and oedema of the affected part and a cordy appearance of the vein itself. The treatment should involve rest and fomentations of the part, and, if practicable, the thrombus should be removed by a surgical operation. P. is often associated with varicose veins of the leg.

Phlebotomy, see BLEEDING and VENESECTION.

Phlegethon (flaming), in Gk. mythology, a riv. of fire which encircled the infernal regions and emptied itself into Lake Acheron.

Phlegm, mucous secretion, with impurities such as dust and bacteria, expelled by coughing from the lower air passages.

Phlogiston Theory, in chem., a theory of combustion elaborated by J. J. Bercher (1635-82) and G. E. Stahl (1660-1734). According to this theory, all combustible bodies contained a 'principle of combustion', *phlogiston*, which they gave up to the air or to other bodies when burnt. Though the P. T. was enthusiastically supported by Eng., Ger., and Fr. chemists in the eighteenth century, it was overthrown by the work of Lavoisier (*q.v.*) who showed that on combustion a burning body combined with atmospheric oxygen and that the products weighed more than the original substance. See E. J. Holmward, *Makers of Chemistry*, 1931.

Phlorizin (Gk. *φλοῖς*, bark; *ρίζα*, root), glucoside found in the bark of the roots of sev. allied plants, such as the apple, pear, and cherry.

Phloroglucinol, or symmetrical trihydroxybenzene, $C_6H_3(OH)_3$, colourless crystalline solid (melting point 218°), formed by fusing resorcinol (*q.v.*) with caustic potash in the presence of air. It gives a dark violet colour when treated with ferric chloride solution. It is used as an analytical reagent.

Phlox, well-known genus of plants in the family Polemoniaceae. There are fifty species, which grow wild in N. America and Siberia, and sev. are cultivated in Britain.

Phnom-Penh, see PNOM-PENH.

Phocæa (modern Fokha or Fokia), ant. Ionian city on the W. coast of Asia Minor. Its inhab. were noted for their maritime pursuits, and founded the colonies of Massilia (Marseilles) and Alalia in Corsica. During the sixth century B.C. it submitted to the Persian yoke, but in 500 joined in the Ionian revolt against Persia. The modern town was founded by the Genoese in 1421.

Phocæa, see under BYZANTINE EMPIRE.

Phocids, see SEAL.

Phocion (c. 402-317 B.C.), Athenian general. He distinguished himself at Naxos (376), with Evagoras conquered Cyprus (351), restored the power of Athens in Eubœa (349), and drove Philip out of Chersonesus (340). He showed his wisdom in advising cessation of hos-

tility with the Macedonian king and in trying to check the Athenian policy of war. He was involved in the intrigues of Cassander, and, in particular, was suspected of having advised Alexander, son of Polyperchon, to seize the Piræus in 318; Alexander, to whom he fled, betrayed him to the Athenians and he was compelled to drink the hemlock. There are lives by Plutarch and Cornelius Nepos.

Phocis, prov. of ant. Greece, N. of the gulf of Corinth and W. of Boeotia, and traversed by the mt. range of Parnassus (8068 ft.). The Delphic shrine, though within its borders, was held by Dorians who in the 'sacred war' of 590 B.C. strove to free themselves from Phocian supervision. A similar Phocian war lasted from 356 to 346, ending in the fall of P. at the hands of Philip of Macedon, who razed all the Phocian towns to the ground excepting Abœ.

Phocæa, see PORPOISE.

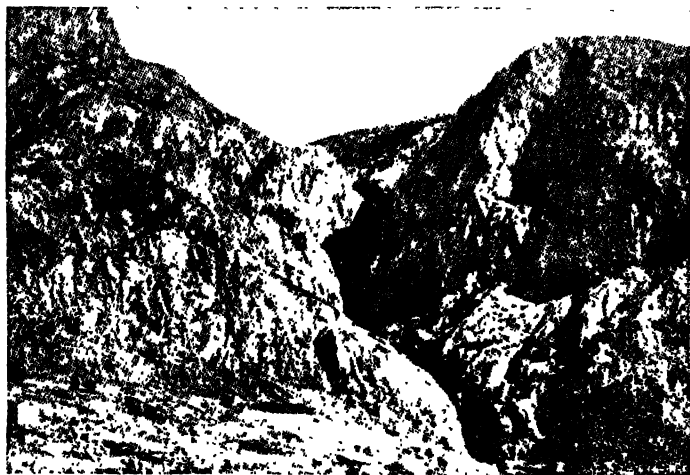
Phœbus and **Phœbe** (bright), names of Apollo, the sun god, and Artemis, the goddess of the moon, respectively.

Phœnicia. Out of two Gk. forms, *φαινή*, *-κος*, and *φαινία*, the Romans formed the Lat. names for Carthaginians, *Pœnici* and *Pœni*; the change from *ph* to *p* was due to Etruscan influence; the etymology of *φαινή* is uncertain, but traditionally explained as 'palm-tree'; it is more probable that it meant 'red' (due to the sunrise from the Gk. point of view), 'Orient', 'Levant.' The indigenous name was *Kana'an*, Heb. *Ken'an*, Accadian *Ki-na-hhi*, *Ki-na-hna*; Egyptian *K'-n'-n'*. This ant. country extended along the E. coast of the Mediterranean, perhaps from the Amanus Mts. on the N. to Mt. Carmel on the S., and was bounded on the E. by the mts. of Libanus and Anti-Libanus (*i.e.* Lebanon). Its N. and S. as well as its inland frontiers differed at different periods, according to the gradual progress and decline of its people, and, indeed, so uncertain would their boundaries appear to have become after the loss by the Phœnicians of their independence, that no two Gk. or Rom. writers can be found to assign the same limits to their ter. The chief towns, which were for the most part built on the coast or upon is., were, from S. to N., Arco (subsequently Ptolemais and then St. Jean d'Acro); Tyre and Sidon, for some period the chief of all the Phœnician cities; Sarcpta (Sarpad), between Tyre and Sidon, and mentioned in the list. of Elijah as Sarpadath (1 Kings xvii. 9); Berytus (modern Beirut), a few m. N. of Sidon (later the Rom. colony Felix Julia); Byblos (Heb. Gebel, Phœnician Gubli, modern Jubel or Djebail), 24 m. N. of Berytus, the seat of the governor of P. in the Tel el-Amarna period and of the worship of the goddess Baaltis; Tripolis (now Tarabulus), so named because it originally consisted of three cities, each a furlong distant from each other, and each with its own ramparts; and Arvad or Aradus (modern Ruad) on an is. N. of P., and whose fleet is mentioned in the Tel el-Amarna tablets. Ugarit (modern Ras Shamrah), situated opposite the most easterly cape of Cyprus (some 6

m. N. of Latakia), was a flourishing city in the second half of the second millennium B.C. The soil produces at the present day pine, fir, cypress, cedar, terebinth, palm, sycamore, acacias, olives, figs, wheat, barley, rye, apricots, peaches, almonds, pomegranates, citrons, grapes, bananas, cotton, indigo, and tobacco; the mineral ores are confined to iron and stone. It is difficult to say for which of the two occupations, mining or navigation, this industrious and energetic people was more renowned. The rough, rocky soil did not tempt the Phœnicians to become farmers, but the great blue waters before them, and the splendid cedar forests which covered their mts., made

the coast-line, however, the names of Phœnician trading posts are found in various parts of the Mediterranean, even in Greece and Egypt. The strongest settlements of the Phœnicians were always on the is. Cyprus was especially favoured by them.

The goods which the Phœnicians brought to Greece were imitated by the inhab. of the land so far as they were able. The jewellery of gold and silver, the bronze utensils and armour, the painted vases and terra-cotta figures which the primitive Gk. procured from the Sidonian merchant were his earliest models. P. had copied her art from Egypt or Mesopotamia or inland Syria, and as a rule they handed



PHOCIS: THE SITE OF DELPHI

them, as far as we now know, the first sailors who ever sailed out of sight of land. To obtain metals for their craftsmen they sailed into every part of the Mediterranean and apparently even into the Atlantic Ocean to Gaul and Britain. They brought gold and silver from Spain (perhaps also gold from Ireland), copper from Cyprus, and probably iron and tin from Britain. They brought pearls from the E., perfumes and spices from Arabia, fine linen from Egypt, lions' and panthers' skins from Africa. They made useful articles of this material, and sold them in all parts of the ancient world. The most famous adventurous voyage is the *periplus* around Africa achieved by the Carthaginian Hanno (perhaps fifth-fourth century B.C.), as told by Pliny, *Hist. Nat.* II., 169. The Phœnicians did not usually penetrate far from the coast, but the legends of the foundation of Thebes seem to show at least one case in which the Phœnician trader pushed boldly inland, and built his settlement 12 or 15 m. from the sea. On

those elements on, usually somewhat altered, to other regions. Thus Greece in her turn took her early art at second hand, the foreign, indirect influence being plainly traceable. Centuries, however, were to pass ere the borrowers succeeded in abandoning the stiff conventional style which they had originally adopted from their instructors. It was not only in arts and handicrafts that the Phœnicians left their mark on Greece; the religion of Greece shows traces of Phœnician influence. Aphrodite, for instance, is but a modification of the Phœnician Ashtaroth, Hercules of Melgart. By far the most important Phœnician contribution to Gk. culture was the transmission of the alphabet (*q.v.*). An idle story runs that glass making was discovered by shipwrecked sailors who found that the sandy shore with the many shells ground up by the waves became coated with glass beneath their camp fires. The Tyrian purple, obtained at great cost from shellfish, a sort of Phœnician whelk, known as a *murex*

(each yielding but a drop of dye), was famous all over the world. The Rom. emperor wore a purple toga; the term 'royal purple' is still current.

The Phoenicians belonged to the N.W. branch of the Semites (*q.v.*). It is difficult to conjecture the precise date of the settlement of the Phoenicians on the Syrian coast. It is clear that the Phoenicians must have settled on the coast of the Mediterranean at a very early period. The Phoenicians were part of the second wave of Semitic migration, and probably settled on the Mediterranean coast during the fourth millennium B.C., but they do not appear in hist. before the eighteenth century B.C.

History.—Apart from the evidence from cuneiform and Phœnician inscriptions, the sources of Phœnician hist. are confined to the Bible and to Gk. historians such as Herodotus, Menander of Ephesus, Josephus's fragments of the Phœnician Deus's hist. of Tyre, Justin, and a few others. The extraordinary discoveries (1933-38) of the Fr. scholar André Parrot at Tell Hadrin (anc. Mari) on the Middle Euphrates of the royal archives (containing over 20,000 tablets written in cuneiform script) show that the Amorite kingdom of Mari of the eighteenth century B.C. had diplomatic and commercial relations both with Mesopotamia and the cities situated on the Mediterranean coast. Amongst the numerous states and ins. mentioned in the Mari tablets we find the important Phœnician city-state of Byblos. Excavations in P. show that in the eighteenth century B.C. (and probably even earlier) this country was under Egyptian control. Even in the far N., at Ras Shamrah (anc. Ugarit), and in the far E., at Qatna (N.E. of Hama), there have been found monuments attesting to the direct connections between P. and the Egyptian kings. The archaeological find at Byblos give a vivid idea of the extent to which the art and craftsmanship of P. were influenced by Egypt in the nineteenth and eighteenth centuries B.C. After the Hyksos invasion of Egypt, which brought the downfall of the twelfth dynasty (middle of the eighteenth century B.C.), P. became independent, and her cities were free to develop economic and military strength without outside interference. With the eighteenth dynasty (c. 1550 onwards), however, and particularly with Thothmes III. (first half of the fifteenth century), P. became an Egyptian prov. The glory of P. only truly began with the recovery of its independence on the decay of the Egyptian Empire in the fourteenth century B.C. At that period Byblos was the first city of P., and as it was the chief centre of trade in papyrus, the Gks. have taken the word *βύβλος* for 'papyrus' and 'book' (hence, many centuries later, the name *τὰ βιβλία*, 'the Bible'). Later Sidon and Tyre achieved the hegemony of P. From the eleventh or tenth century onwards P. estab. colonies throughout the Mediterranean coasts. At the end of the second millennium B.C., with the definite or temporary political decay of the great nations of the Bronze Age, the Egyptians,

the Babylonians, the Assyrians, the Hittites, the Cretans, in the E. Mediterranean, we enter a new historical world. P. (as well as two other Semitic nations, Israel and Aram) played an increasingly important part. To the W. of P. seeds were sown amongst the eager-minded peoples which later constituted the nation of Hellas, the Gks. A vast Phœnician colonial empire was built up in the E., S., and W. Mediterranean, in Cyprus, N. Africa, Malta, Sicily, Sardinia, Marseilles, and Spain. Trading colonies were estab. in Greece, Egypt, and other countries. In the tenth century B.C. Tyre, under Hiram I., son of Abibal, and contemporary of David and Solomon, became the leading Phœnician state. Solomon requested the aid of Sidonian artificers and a supply of cedar wood from Lebanon for the construction of the temple and royal buildings; and if, as tradition says, Phœnician workmen built the whole temple, its brazen pillars and remarkable Holy Place were sufficient testimony to their skill in applied art. The golden age of P. waned when Hiram's third successor, Ithobaal, having murdered the last of the sons of Hiram, seized the throne and assumed the style of 'king of the Sidonians.' In 876 B.C. Awad, Byblos, Tyre, and Sidon were under Assyrian domination, and paid tribute to the Assyrian king, Assurnazipal. Under Hiram II. Tyre was trib. to Tiglath-pileser III. of Assyria, but the next Tyrian and Sidonian king, Luli or Elulenis, revolted and successfully withstood a siege by Shalmaneser V. During Sennacherib's campaign against Hezekiah (701 B.C.) Luli fled to Cyprus, though Tyre still held out. Arvad and Gubal (or Byblos), however, surrendered to the Assyrians. At this time Sidon was under the rule of an Assyrian nominee, Ithobaal; under his successor, 'Abdmilkut, it rebelled against Assarhaddon in 678 B.C., was destroyed, and then rebuilt. Tyre, after the destruction of Sidon, assumed the hegemony of so much of P. as was left independent, but was besieged at various times, and finally in 588 B.C. by Nebuchadnezzar. Its king surrendered, and a puppet king (Baal II.) was appointed, who reigned from 574 to 561 B.C. Afterwards the monarchy of P. gave way for a time to a system of gov. by *suffetes*, or judges. With the fall of Babylonia (539 B.C.) P. passed under Persian rule, and (together with Cyprus and Syria) she became the fifth Persian satrapy, but the Phœnician cities continued to have their kings and local autonomy. Phœnician fleets were frequently employed by the Persians in naval warfare, as in the attack on Miletus during the Ionian revolt, 498 B.C., and again, in 480 B.C., the most reliable portion of the Persians' naval forces was composed of the ships of the Phœnician cities. But at the battle of Eurymedon, when Persian naval power was completely broken, Cimon of Athens intercepted eighty Phœnician galleys and destroyed most of them off the coast of Cyprus (480 B.C.). A Phœnician navy was also engaged in the closing stages of the Peloponnesian war.

After the restoration of the Phœnician monarchy Tyre in 332 B.C. was burnt by Alexander the Great (Awad, Byblos, and Sidon, on the other hand, with joy had accepted Alexander the Great). Soon the last vestige of independence in P. was gone, and in 64 B.C. it sank to the position of a Syrian colony of the Romans.

The chief, if not the only, reliable sources of our information concerning the religion, manners, and laws of the Phœnicians, are the Phœnician inscriptions (see below) and coins. The latter may be divided into three groups: (1) The earliest period, i.e. from the beginning of the Phœnician coinage (end of the fifth century B.C.) until Alexander the Great: coins from Arvad, Byblos, Tyre, Sidon, and others; (2) the period of Alexander, the Ptolemies, and the Seleucids: coins of Arvad and Sidon, with the representation of the *tyche* (Fortune), of Tripoli, with the Dioscuri, of Tyre, with the head of Melqart, etc.; (3) the period of the Rom. Empire: mainly coins representing the temples of Berytus, Tripoli, Tyre, Sidon, and so on.

Language.—The Phœnician language, now extinct, belongs (together with Heb., Moabite, Ammonite, Edomite, all strictly related to each other, and perhaps also the language of the numerous Ugurite or Khas Shanirah inscriptions) to the Canaanite main branch of the N.W. subdiv. of the Semitic linguistic family. The other main branch of the N.W. subdiv. is Aramaic. The E. or N.E. subdiv. consists of Accadian (or Akkadian), including Babylonian and Assyrian, while Arabic and S.-Arabic (including Ethiopic, Amharic, and all the dialects) form the S. subdiv. of the Semitic languages. Phœnician was the speech current in pre-Christian times in the commercial cities of the Phœnician coast, Tyre, Sidon, Byblos, and the neighbouring *ins.*, where it was spoken for over 1500 years. It also was the language of the numerous Phœnician colonies along the Mediterranean shores, and particularly at Carthage and its colonies—the Carthaginian dialect is known as Punic. Phœnician inscriptions have also been found in the *is.* of Cyprus, in Greece, in Malta, Sicily, Sardinia, Marseilles, Avignon, and Spain. Two extremely important Phœnician inscriptions (including a Phœnician-Italic bilingual) were recently discovered at Karatepe in E. Cilicia. In the W. Mediterranean, especially in the ter. of Carthage, the Punic dialect outlived the fall of this metropolis as well as the Phœnician language of the mother country; in the fifth and sixth centuries A.D. it was still the language of the peasants, and probably continued to be so until the Arabic conquest. It may thus be said that Phœnician was spoken for about 2000 to 2250 years, or even longer.

Z. S. Harris, the author of two outstanding books on Phœnician (*A Grammar of the Phœnician Language*, 1936, and *Development of the Canaanite Dialects, an Investigation in Linguistic History*, 1939), subdivides the Phœnician language as follows: (1) Early Phœnician, down to the

end of the ninth century B.C.; (2) Middle Phœnician, eighth to sixth centuries B.C., inclusive; (3) Late Phœnician (in P. itself), fifth century B.C. to the beginning of the Christian era; (4) Punic, c. fifth century B.C. to 146 B.C. (i.e. to the destruction of Carthage); and (5) Neo-Punic, 146 B.C. to the sixth century A.D. or to the Arabic conquest. The Phœnician inscriptions (including the Punic and Neo-Punic inscriptions) are our main source for the study of the Phœnician language. Comparatively few inscriptions were found in P. itself, but the earliest of them, including the Ahiram egyptaph, belonging to the last centuries of the second millennium B.C. or the first century of the first millennium B.C., are the earliest extant readable inscriptions, written in the N.-Semitic alphabet, the prototype of all existing or discontinued alphabets (see under ALPHABET). The next few centuries have been rather poor in their yield; the bulk of material from P. proper is late and consists largely of royal *stelæ*, belonging to the fourth-second centuries B.C. By far the largest number of Phœnician inscriptions are the Punic inscriptions, of which thousands have been unearthed in Carthage; nearly all of them, however, are of pure votive or funerary character. The main differences between the Phœnician and the 'Punic' inscriptions are the following: (1) The latter became more and more cursive; these differences, with a few exceptions, were purely external: the number and the phonetic value of the letters remained always the same; the direction of the lines, always horizontal, was constantly from right to left. (2) The Punic inscriptions linguistically betray the mixed pop. of the empire of Carthage, which may be termed 'Berber-Phœnician' or 'Libyo-Phœnician'.

Another source for the study of the Phœnician language is contained in the transcriptions of Phœnician words into the scripts of other languages, such as Egyptian, Assyrian, Heb. (in the Bible), and particularly in the classical literature or Grk. and Lat. inscriptions. These transcriptions are very important because they give, if only in a limited way, a picture of the vocalisation of Phœnician, whilst the Phœnician and Punic inscriptions are purely consonantal. The only example of connected Phœnician discourse in transcription appears in Plautus' *Pœnulus* (v. 1. and *ll.*), which contains a monologue of ten lines in Punic—with Lat. paraphrase—of a Carthaginian of Plautus' times (late third century B.C.).

Religion.—Like all ant. Semitic religions, except that of the Hebs., the Phœnician religion was a pantheistic and personified worship of the forces of nature. Until recently one of the main sources for the study of Phœnician mythology was the work of Philo of Byblos, a Phœnicio-Grk. historian, who apparently was born c. A.D. 12, and still lived in 117. His work was supposed to be based on the works written by Sanchuniathon, a Phœnician priest born in Berytus c. eleventh century B.C. Unfortunately Philo's work has only

been preserved in fragments quoted by late Gk. historians. Our historical sources of the Phoenician religion are thus very meagre and indirect: the best version of Sanchuniathon's account of Phoenician religion given by Philo is excerpted from Porphyry in Book I., chapter ix., of Eusebius' *Præparatio Evangelica*. Our knowledge has been greatly supplemented by recent discoveries at Ras Shamrah (see above). At that site, in 1929 and the following years, hundreds of clay-tablets, dating from the fifteenth and early fourteenth century B.C., were found (written in a hitherto unknown cuneiform alphabet of thirty-two letters: see under ALPHABET), which proved to be documents of incalculable value in many fields of research, but particularly in hist. of religion. Many of these documents were found in a library housed in a building situated between the city's two great temples, one dedicated to Baal and the other to the god Dagon. The majority of the documents are in the nature of mythological poems concerning early Phoenician gods and heroes. These early Phoenician religious beliefs are of the greatest interest, and their possible relationship with many of the religious beliefs and practices reflected in the O.T. has already been discussed by many scholars. The supreme god is known as El (= 'God' in the Heb. Bible). The wife of El is Asherah-of-the-Sea, the counsellor of the gods, and their son is Ba'al, who is the god of the rain and storm. Amongst the adventures related of Ba'al is a conflict with Lotan (= probably the Heb. Leviathan). Aliyan Ba'al represents the growth of plants, and fights against Moth (= 'Death'), the god of the dried-up summer soil, but is slain by him. The goddess Anath, the sister and lover of Aliyan, goes in search of him, recovers his body, brings him back to life, slays his enemy, Moth, and places Aliyan on Moth's throne, to assure the revival of vegetation in another season. Another myth tells of the time when El entrusted Kerith with the command of 'the army of the Negeb.'

The later Phoenician religion is known, but very imperfectly indeed, from the various inscriptions (see above). Every city and high place had its local Baal, and there were, as well, Baalim of the mts. and rvs. By the side of Baal stood his female counterpart, Baalath. But the female element in nature was usually adored under the name of Ashtoreth or Ashtart. Among the other main gods must be included Melkarth (king of the city), the supreme 'Baal of Tyre.' There can be no doubt that Phoenician idolatry, human sacrifices, and 'prostitution practised in the name of Ashtoreth' recall the worst features of pagan worship. Later, at Carthage and Marseilles, a ram was substituted for the human sacrifice and a meat-offering prescribed.

See H. R. Hall, *Ancient History of the Near East*, 1913; E. Kiehl Chatterton, *The Romance of the Sea Rovers*, 1924; G. Contenau, *La Civilisation phénicienne*, 1926; and Z. N. Harris, *A Grammar of the Phœnician Language*, 1936.

Phoenicopteridae, see FLAMINGO.

Phoenix, in anct. Gk. legend, was the son of Amyntor and Ilippodamia. Having quarrelled with his father by gaining the affections of his father's mistress, Cleobule, he was banished and fled to Peleus. Peleus made him tutor to his son, Achilles, whom he accompanied to Troy (*Iliad*, ix.)

Phoenix, cap. of Arizona, U.S.A., co. seat of Maricopa co., on the Salt R., 100 m. N.E. of Tucson. The chief industry is agriculture, the processing of dairy products, and the export of citrus fruit; Indians deal in precious stones. Pop. 65,100.

Phoenix, fabulous sacred bird of Egypt, according to the people of Heliopolis, visited them once every 500 years on the death of its father. The story, as told by Herodotus, who did not believe it, was that the P. came from the Arabian desert, bearing its father embalmed in a ball of myrrh, and buried him in the temple of the sun. It was said to resemble an eagle in size and shape, but had red and gold plumage. According to another story the bird placed itself on the burning altar at Heliopolis, and from the ashes there flew a young P., freshly feathered. Pliny's version is that it built for itself a nest in which to die, and that a new bird sprang from the corpse. There was never more than one P. at a time.

Phoenix Group, eight small is. in the W. Pacific Ocean, between 2° 30' and 4° 30' S. lat., and 171° and 174° 30' W. long., annexed by Great Britain in 1889-92. They form part of the Gilbert and Ellice Is. administration. The U.S.A. has aviation and communication facilities on Enderbury and Canton Is. Area 16 sq. m. Pop. 850.

Phoenixville, bor. of Chester co., Pennsylvania, U.S.A., 23 m. N.W. of Philadelphia. Pop. 14,000.

Pholis, see CENTROLOTTUS.

Phonetics, branch of science which deals with the speech sounds of the human voice and investigates their production, combination, interaction, and list. A close study reveals differences in sounds which at first appear identical and directs attention to the particular part of the vocal organs where the difference arises. The study of the vocal organs is a prime necessity in P. Speech is produced by the passage of air from the lungs through the larynx, modified by the various resonance chambers set up in the mouth and nose. In its passage through the larynx the air may cause the vocal chords to vibrate, in which case a 'voiced' sound is produced. If the chords are not set in vibration a voiceless sound is made. For most voiced sounds there is a corresponding voiceless one. The difference between them may be ascertained by repeating the sounds, v, f; z, s. In uttering the first sounds of these pairs, if the ears be stopped by the fingers, or a finger placed on the throat, the vibration of the vocal chords can be noticed, while it will be found to be absent when the second sound of each pair is uttered.

Sounds are again subdivided according to the action of the mouth and nasal passages: (1) If the air is allowed to escape

almost unimpeded the resultant sound is a vowel. Vowels were formerly defined as those sounds which could be produced independently of other sounds, in contradistinction to consonants which needed the help of a vowel for their expression.

(2) If, however, the passage of the mouth be narrowed but not closed a rubbing sound, termed 'fricative,' is produced varying according to the precise position of the narrowing. Such sounds are s, z, th, sh, zh, which can be pronounced without vowels and continued for any length. Hence they are also termed 'continuants.'

(3) The passage of the mouth may again be completely blocked during the issue of the air. This action gives rise to the sounds known as 'plosives' or 'stops,' e.g. b, p, t, d, k, g, etc. Such stopping of the sound consists of the 'applosion' at the instant of stopping, and the 'explosion' when the breath forces its way through the obstacle. In initial plosives the explosion is most evident, while in final ones the applosion is the chief sound. (4) If, by lowering the velum or soft palate, the breath be allowed to issue through the nose, the sound produced is a nasal (voiced or voiceless). Sounds are classified according as the following or closure takes place between the back of the tongue and the soft palate (velar or back continuants, stops, nasals), between the front of the tongue and the hard palate (palatal or front continuants, stops, nasals), between the blade of the tongue and the ridge above the upper teeth (dental continuants, etc.), between the upper teeth and lower lip (labio-dental), and between the upper and lower lips (labial).

A systematic representation of P. can only be made where each sound is denoted by its own particular symbol. The variety of sounds in each language is, however, so great, and the differences between the several languages so pronounced, that the ordinary alphabet is far from being adequate for this purpose. The system of representation now generally in vogue is that of the Association Phonétique Internationale, and it is used in this article.

Vowels.—The character of the vowel sounds is determined by the place of articulation and the height to which the tongue is raised. Articulation may take place between the front of the tongue and the hard palate, or between the back of the tongue and the soft palate, or intermediate between these two points, when the middle of the tongue is but slightly raised. The position of the lips also modifies the sound. They may be either rounded so as to form a ring, or neutral. Usually back vowels are accompanied by rounding the lips and front ones by relaxing them. A long vowel is phonetically indicated by the sign : . The back vowels are (u), (U), (o), (ɔ). In (u) the back of the tongue is raised quite close to the soft palate, while the lips are well rounded. The sound is heard in Fr. *rouge* and Ger. *du*. In Eng. the sound is rarely pure when long, generally merging into the consonant (w), so that 'too' is represented phonetically by (tuw). It occurs when short, however,

as in 'pull' (pul). When the tongue is not raised quite so high as for (u) a more open sound (U) results. This sound does not occur usually in Eng. and Fr., but is common in Ger., as in *Lust*, *und*. With the tongue still further lowered and the lips less rounded are produced the close (o) sound and the more open (ɔ). The former may be heard in Fr. *rose*, *collé*, and in Ger. *sonit*. In Eng. it does not occur pure, but is rendered as a diphthong, the second part of which is an unstressed (u). Thus 'no' is phonetically (nou). The open (ɔ) sound occurs in Eng. long in 'law' (lɔ) and short in 'not,' a difference in quantity being noticed owing to the short (ɔ) being lax. (ɔ) is also heard in Fr. *robe*, *or*, and Ger. *Sonne*.

There are two intermediate vowels, pronounced rather to the back of the middle of the tongue, which is lower than in the case of other vowels, while the mouth is held more open. These are represented by (a) and (ɑ), the former of which is pronounced more to the rear of the tongue than the latter, and is heard in 'father,' Fr. *Ami*, *père*, Ger. *Vater*. The (a) sound occurs in Fr. *rage*, *patte*, and is also the first part of the diphthongs in 'hail' (hai), 'how' (hau). If the back of the tongue be raised slightly the (a) sound changes to the sound of 'u' in 'but' represented by (ʌ). Somewhat more forward on the tongue is pronounced the vowel sound of 'put' represented by (ʊ), and still further forward with the tongue more raised are attenuated (ɛ) and (e), the former, more open, being heard in 'there' (ðɛ ʊ), Fr. *ci* (tɛ ʊ), Ger. *hier* (hɛ r); the latter, more closed, in 'dead' (ded), Fr. *ble* (ble), Ger. *fahlen* (fɛ:lən).

The foremost vowels in which arching of the tongue is most pronounced, are (open) (i) and (closed) (ɪ). The difference between these two sounds is not often made. The former is heard in Eng. in 'it,' Ger. *Ittelt*; the latter in Eng. before 'r' as in 'tear' (tɪə), Fr. *sire*, Ger. *mir*. Elsewhere in Eng. it is diphthongal, ending in a consonantal (i) sound as in 'meet' (meɪt). When the forward vowels are pronounced with the lip-rounding of the rear vowels modified sounds are produced. Corresponding with (ɛ) is the sound (œ) heard in Fr. *neuf* (neʃ) Ger. *ueben* (œben), and with (e) the sound (ɘ) as in Fr. *feu* (fø), Ger. *schon* (ʃɔn). The sound (u) pronounced with lip rounding is modified to (ʊ) heard in Fr. *ruze* (ryz), Ger. *Sunde* (ʏndə). An indefinite vowel is pronounced when the tongue is raised in the middle represented by (ə) (turned e), which occurs in unaccented syllables, as in 'stirrup,' 'butter' (stɪrəp, bʌtə), Fr. *le*, Ger. *little*. In Fr. the sounds (ɔ, ɛ, œ, and a) are sometimes pronounced with the soft palate lowered, allowing issue of air through the nose and giving well-characterised *nasal* sounds. The phonetic transcript of these sounds is (ʒ, ɛ̃, œ̃, ɑ̃), as heard in *bon*, *vin*, *humble*, *grand* (bɔ̃, vɛ̃, œ̃mbʁ, grɑ̃). In Eng. the vowels are lax or wide, in Fr. they are 'tense' or 'narrow,' while in Ger. they are also 'tense,' though not quite to the same degree.

Consonants.—*Continuants* are formed by the narrowing of the oral passages. They include the labio-dental sounds (v) and (f) as in Eng. 'very' and 'find,' the bilabials (p) as in Sp. *suber*, voiced (w) as in 'wet,' unvoiced (u) as in N. Eng. 'which,' the sibilants s, z, ʃ as in 'rash' (ræʃ), ʒ as in 'vision' (vɪʒən), the hisping sounds (θ) 'th' in 'thin' and (ð) in 'this' (ðɪs), palatal continuants as (ç) in Ger. *ich*, (j) in Fr. *jeur*, Eng. 'yes,' velar or back continuants as (g) and (x), the former in Sp. *luego*, the latter in Scottish 'loch,' Ger. 'ach.' It is generally produced in Fr. and Ger. by vibration of the uvula, and is designated by (R). The trilled (r), caused by vibrating the tongue-point, is, however, most used in country dists., and is alone held to be correct for singing and the stage. The Eng. 'r' at the end of a word is merely the sound (ɹ) (see under vowels), as 'there' (ðe:ə), while at the beginning it is caused by a tap of the tongue against the base of the teeth. L is a voiced 'lateral' caused by a narrowing between the side rims of the tongue and the side gums. In Fr. and Ger. it is sharper and less prolonged than in Eng. The 'll' of the Welsh language is really an unvoiced 'l' sound. It is also a continuant caused by forcing the breath under pressure through the mouth. It may be held to be a glottal spirant, but is very vocalic in character.

Plusives or Stops.—These consist of the palatal sounds g and k, the dental d and t, and the labial b and p. Slight aspiration occurs with the voiceless stops before accented vowels in Eng. and Ger. (ph, th, kh). In Fr. g and d in *laine* are pronounced k and t. A characteristic Ger. sound is the glottal stop (ʔ) caused by the opening of the glottis and resembling a faint cough. It precedes a vowel at the beginning of a word or sound part of a compound as *ein* ('ain), *Verrein* (fer'ain).

Nasals.—In these sounds the stoppage is practically the same as that of the plusives, the breath being, however, allowed to escape freely through the nose. They are usually voiced, the dental nasal 'n' corresponding to 't,' 'd,' the labial 'm' to 'b,' 'p.' The velar nasal (ŋ) as in 'long' (lɒŋ), Ger. *denken* (dɛŋkən) to 'g,' 'k.' In Fr. there is a palatal nasal (j) as in *régner* (rɛʒnɛ).

See W. Viëtor and W. Ripman, *Elements of Phonetics, English, French, and German*, which is a very useful little book for beginners. Other good books are Laura Soames, *Introduction to English, French, and German Phonetics*, revised by Viëtor, 1899; P. Passy, *Sons du Français, Chrestomathie Française*, 1901; W. Viëtor, *Die Aussprache des Schriftdeutschen*, 1909; 1914, 1919; M. D. De Witt, *English English and World Standard English*, 1924; J. C. Ward, *English Phonetics*, 1929; and W. Ripman, *English Phonetics*, 1931.

Phonograph, see GRAMOPHONE.

Phonography, see SHORTHAND.

Phormion, commander of the Athenian fleet during the fifth century B.C. He gained, among other victories, two at

Naupactus over the Peloponnesian fleet in 429 B.C.

Phoridium, genus of hardy herbaceous plants, see FLAX; NEW ZEALAND.

Phoronis, solo genus of the class Phoronida, consisting of a few species of marine worm-like animals, which may live on rocks or in shells of Molluscs. They are widely distributed at depths varying from low water to about thirty fathoms. Each animal is encased in a tough flexible tube into which it may completely withdraw. At the anterior end is a horse-shoe-shaped group of tentacles. The fertilised eggs affix themselves to the tentacles and there develop into larvae of the actinotrocha form. P. has affinities with the Polyzoa and Sipunculoida.

Phosgene, or Carbonyl Chloride, chloride of carbonic acid. When a mixture of equal volumes of carbon monoxide and chlorine is exposed to bright sunlight or passed over heated animal charcoal, direct combination occurs with the formation of P. or C. C., COCl₂ (Gk. *phos*, light, and *gennao*, I produce). This compound, discovered by John Davy in 1811, is a colourless heavy gas, nearly 3.5 times as heavy as air, with a penetrating and suffocating odour which heightens the sense of taste, and is very poisonous, far more so than carbon monoxide. It is readily liquefied by cooling, forming a colourless, mobile liquid, boiling point 8.2°. The gas does not fume in moist air, but is readily hydrolysed by water. Hot water decomposes it quickly to carbon dioxide and hydrochloric acid, COCl₂ + H₂O → CO₂ + 2HCl. When the gas is passed into a solution of ammonia in toluene, urea is formed. P. has been used in chemical warfare (*q.v.*). A practical application of the gas in industry is made in the preparation of certain dyes, *e.g.* crystal violet. See J. R. Partington, *A Text-Book of Inorganic Chemistry* (11th ed.), 1933.

Phosphates, salts of phosphoric acid, H₃PO₄. By the action of sodium hydroxide on this acid in calculated quantities, the following P. can be obtained. NaH₂PO₄: Sodium dihydrogen phosphate. Acid to litmus. Na₂HPO₄: Disodium hydrogen phosphate, or ordinary sodium phosphate. Slightly alkaline; used as a reagent, and in the preparation of artificial drinking waters Na₂HPO₄: Normal sodium phosphate—alkaline; used as a water softener. Microcosmic salt is HNa₂HPO₄·4H₂O. All the above are soluble P. Silver phosphate, Ag₃PO₄, is insoluble.

There are also pyrophosphates and metaphosphates, salts of pyrophosphoric acid and metaphosphoric acid respectively. They are of less importance than the ordinary (or ortho-) P.

Tests.—Soluble P. give precipitates with ferric chloride (yellow-white); with silver nitrate (yellow); with warm ammonium molybdate (yellow). See MINERAL PHOSPHATES.

Phosphor Bronze, copper-tin alloy to which phosphorus has been added and capable of being made tough and malleable. In one type 0.02–0.1 per cent of phosphorus has been added for the pur-

pose of deoxidation, and in which, on analysis, practically none will be found; in the second type 0.2-0.4 per cent of phosphorus is added, thereby increasing the toughness of the alloy. It is used chiefly for springs and for bearings: for springs the alloys contain 4.8 per cent of tin, and for springs 9-11 per cent.

Phosphor Copper is formed by plunging a stick of yellow phosphorus, contained in a copper sheath, under the surface of molten copper. The phosphorus boils, passes through the molten copper, and is absorbed, forming a compound Cu_3P . There are two P. Cs. used commercially, containing 10 per cent and 15 per cent respectively of phosphorus. It is used for making phosphor bronze (see preceding article).

Phosphorescence, term first applied to describe the state of luminescence which certain substances show in the dark after exposure to light. Such bodies were called 'phosphori,' and the term was afterwards applied to animals similarly endowed. Almost all bodies are phosphorescent in some degree. When the P. is continuous (as in fluor spar, quinine, etc.) it is called fluorescence (*q.v.*). In minerals P. may be shown by (1) heating to a temp. below red heat (fluor spar); (2) friction (phosphorus and fused calcium chloride); (3) Cleavage (mica, the two split portions exhibiting positive and negative electricity); (4) Crystallisation (boracic acid after fusion).

In the organic world we find numerous cases of P. The luminosity of decaying matter was at one time adduced as the cause of the P. of the sea. Now it is regarded as due to the presence of luminous bacilli. In the vegetable kingdom the cases of P. are limited to algae and fungi, the chief of the latter being hymenomyces. A species of *trochocolum* (majus) was discovered to be luminous by the daughter of Linnæus (1762). All the groups in the animal world up to and including fishes afford examples of the phenomenon. Among the protozoa the luminous noctiluca, which is found around the coasts, emits light from the general protoplasm of the body. On the high seas it is replaced by a species of pyrocystes. The larvae of remora are recorded as luminous porifera. Numerous instances of P. occur among the coelenterata. The jellyfish (Medusæ) are luminous, the scapena (Pneumatulide), and the alcyonarians and siphonophores. The ovoid jelly 'Berda' emits its light only after remaining for some time in the dark. Echinoderms show a few species of ophiuroids. Worms show a large number of luminous types. The luminosity of the worm photodrilus ceases after sexual congress. Among mollusca the bivalve pholas is recorded by Pliny as being phosphorescent, emitting light from the mantle cavity. Of the crustacea the schizopoda are self-luminous, while in others, such as the genera talitrus or orchestia, luminosity is probably due to the presence of luminous bacilli. The angler fish may be cited as an instance of luminous fish. Among insects are the luminous hemiptera (bugs) and coleoptera (beetles).

To the former belong the lantern flies, while the luminous beetles belong to the families of the Lampyridæ or Elateridæ. In some species both sexes are luminous, in others only one. The colour of the light varies, but in all cases the light is monochromatic. The uses of the light are to enable sexes to find one another (earthworms); to serve as a warning signal (stinging coelenterata); to attract prey (angler fish); to illuminate the surroundings (deep-sea fish). See also BACTERIA; LUMINOUS PLANTS.

Phosphoric Acid, see under PHOSPHORUS.

Phosphorus, see LUCIFER.

Phosphorus. Symbol P; atomic number 15; atomic weight 31.02. Discovered by Brand, 1669. An element which exists in two allotropic forms, viz. (1) ordinary or yellow P., and (2) red P. It does not occur in nature in the free state, but usually in the form of phosphates, the most important of these phosphates being the two salts of calcium, phosphorite, $\text{Ca}_3(\text{PO}_4)_2$, and apatite, $\text{Ca}_5\text{F}(\text{PO}_4)_3$, both of which occur very largely in Canada. Calcium phosphate is present in all fertile soils and is a source of phosphate for plants; it also forms the mineral part of bones (60 per cent.), and various compounds of P. are found in the animal body, such as the brain and nerves. The free element was formerly prepared from calcium phosphate, either the natural mineral or bone ash prepared by calcining bones being employed. This, treated with sulphuric acid, is converted into calcium sulphate and phosphoric acid— $\text{Ca}_3(\text{PO}_4)_2 + 3\text{H}_2\text{SO}_4 = 3\text{CaSO}_4 + 2\text{H}_3\text{PO}_4$. The insoluble sulphate is filtered off and the phosphoric acid is evaporated down, mixed with charcoal, the mixture dried in cast-iron pots, and finally distilled in clay retorts. The crude P. which distils over is condensed under water, remelted and purified by oxidising impurities with sodium dichromate and sulphuric acid, or by pressing through chamois leather, and is then cast into sticks. At the present time P. is obtained by heating crushed rock-phosphate (calcium phosphate, large deposits of which occur in Florida, Tennessee, and N. Africa) with sand and powdered coke or anthracite in an electric furnace at 1400-1500° C. P. vapour distils off: $\text{Ca}_3(\text{PO}_4)_2 + 5\text{C} + 3\text{CaSiO}_3$. The calcium silicate, CaSiO_3 , forms a fusible slag which is run off, and the P. vapour is condensed under water. The crude P. is purified as above. The P. obtained in this way is the substance known as yellow P., and is a waxy, transparent substance, which becomes yellow or reddish from the action of light. It has a sp. gr. of 1.82, melts at 44° C., boils at 287° C. On account of its ready inflammability P. is always kept under water, in which it is practically insoluble. It is, however, soluble in carbon disulphide, forming a solution which on evaporation leaves so fine a residue of P. that it at once takes fire in the air. On exposure to moist air, P. glows and gives off garlic fumes and finally ignites. P. burns in air, with a brilliant white light

forming the oxide P_2O_{10} ; burned with a limited supply of air the oxide P_4O_6 is mainly formed. Plunged into chlorine P. takes fire, the pentachloride and trichloride being formed according as the chlorine is or is not in excess. Heated with caustic soda, phosphine, PH_3 , is produced. Red P. will not do this. Yellow P. is very poisonous and in large doses causes death in a few hours. Inhalation of the vapours of P. sets up caries of the teeth and jaw, causing what is known among those employed in the manuf. of matches as 'phossy jaw.' Red P. is formed when ordinary P. is heated for some time to $250^\circ C$ in an atmosphere, free from oxygen. It is purified by boiling with caustic soda, and is obtained as a red powder made up of small crystals, though for a long time thought amorphous. It has a sp. gr. of 2.03-2.34, does not take fire on exposure to air or chlorine, is insoluble in carbon disulphide and in caustic soda, and is not poisonous. The oxides of P. are P. oxide, P_2O_3 ; P. tetroxide, P_2O_4 ; and the pentoxide, P_2O_5 . The first and last are the best known and give rise to P. acid and phosphoric acid respectively. P. acid is formed when P. oxide is dissolved in water, but is prepared by the action of water on the trichloride, $PCl_3 + 3H_2O = 3HCl + H_3PO_3$. The acid can be concentrated and obtained crystalline, forming crystals which melt at $70.1^\circ C$. It is a dibasic acid and is a powerful reducing agent, and on heating is converted into ortho-phosphoric acid with evolution of phosphine. When P. pentoxide is allowed to deliquesce in air it takes up one molecule of water to form meta-phosphoric acid, HPO_3 . Dissolved in hot water it reacts with three molecules of water forming ortho-phosphoric acid, H_3PO_4 . Orthophosphoric acid, or phosphoric acid, as it is called, is commercially obtained by treating bone ash with sulphuric acid. When pure it forms crystals which melt at $38.6^\circ C$. It is a tribasic acid forming three series of salts. On heating above $160^\circ C$ it loses water, forming pyrophosphoric acid as a first product, and finally is converted at red heat into metaphosphoric acid. Pyrophosphoric acid, $H_4P_2O_7$, is a glassy mass and passes into the ortho-acid when its solution is boiled. Ordinary P. is used for making matches. Safety matches contain no P., but are rubbed on a prepared surface of 'red' P. P. is also used for making phosphor-bronze. The compounds are used in sev. ways. The pentoxide is used as a desiccating agent and the phosphide of calcium is used on 'Holmes' signal, which is placed on the water, when spontaneously inflammable phosphine is produced. P. compounds, especially hexamethyl tetraphosphate, have proved highly effective in rendering plants, by which they are absorbed, toxic to biting and sucking insect pests.

Photius (c. 820-91), patriarch of Constantinople, famous for the fact that in his time occurred that rift between E. and W. Christianity which has never been healed for more than a short time. Having previously held high office in the Byzantine

court he was in 858 elected patriarch in place of Ignatius, who had been deposed for correcting the vices of the emperor Michael. Pope Nicholas I., however, accepted the appeal of Ignatius and refused to recognise P., who in return deleted his name from the canon of the mass, an action equivalent to a rupture of communion. A dispute over Lat. missionaries in Bulgaria supervened and made things worse. In 867 P. convened a council at Constantinople to which the papal legates were not admitted, and denounced the errors of the Latins, including the 'Filioque clause' in the creed, i.e. the doctrine that the Holy Spirit proceeds from the Father and the Son (*Filio*). By a turn of fortune at the imperial court P. fell that same year, and Ignatius was restored, but on the death of Ignatius in 879 he again became patriarch, being recognised this time by the pope, John VIII. But the Ignatian party was not extinct, and in 886 the emperor Leo VI. permanently exiled P. He has been treated as a saint by the Gk. Church, and as an arch-enemy and worker of div. by the W. Church. Actually it can now be seen that the schism in his time was not more than the result of a long drifting apart of E. and W., and of alien traditions fruitful in misunderstanding. As a result of the work of Prof. Dvornik, P. emerges as a great churchman, a learned and cultivated scholar, and a genuine Christian, if one subject to the weaknesses of his age; he shared but did not inspire the anti-W. prejudices of his time. His outburst against Rome of 869 acquired a historical significance out of all proportion to its significance in his own life. The causes of the schism undoubtedly lay deeper, in the age-long inability of E. and W. to believe each in the good faith of the other. See works of P. in Migne, *Patrologia Graeca*, vols. cii-civ., 1860. See also J. Ruinart, *Le Schisme de Photius*, 1911; M. Jugie, *Photius et la primauté de St. Pierre et du pape*, 1921; E. Orth, *Photiana*, 1928; F. Dvornik (Orthodox), *The Photian Schism, History and Legend*, 1948 (an important restatement accepted in its main conclusions by the Rom. Catholic historian); and P. Hughes, *History of the Church*, vol. ii., pp. 161-81 (2nd ed.), 1918.

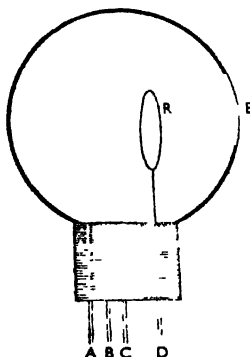
Photo-Chemistry is that branch of chem. which deals with chemical changes that are brought about by the agency of light. The action of the green colouring matter of plants may be taken as typical, as in the presence of sunlight it decomposes the carbon dioxide in the air, the plant assimilating the carbon and setting free the oxygen. The action of chlorine on hydrogen is effected very rapidly in the presence of intense light. The gases combine very gradually in diffused daylight, but have no action on one another in darkness. The rate of chemical action is often proportional to the intensity of the light, but this is not universally true. This action is not confined to any particular wave-length, but the most active in this respect are the violet and ultraviolet or actinic rays. The action of light on photographic plates produces an effect

which is not immediately visible (and is possibly concerned with the formation of sub-salts of silver), but requires another chemical action in order to render it visible; this is called *developing*. Silver salts are very susceptible to the action of light. Thus silver chloride (which is a white substance) when exposed to light assumes a violet and then a dark-brown coloration and finally loses the chlorine. This exemplifies one action of light, namely, decomposition (contrast combination above). Silver bromide is acted upon in the same way. The combination of hydrogen and chlorine referred to is assumed to be preceded by the formation of 'activated' units of hydrogen and chlorine by the action of the light, followed by combination to form molecules of hydrochloric acid. Light may act as a catalyst or as an anti-catalyst; it may start a reaction or completely change the natural course of a reaction.

Photo-Engraving, see PROCESS WORK.

Photo-Electricity. The commercial applications of the photo-electric effect since 1920 have become so extensive and so varied in character that it is doubtful whether any previous scientific discovery has been so rapidly commercialised. The photo-electric effect is the emission of electrons (*q.v.*) from a metallic surface when light falls on it. The first hint of this effect was discovered in 1887 by Hertz (better known for his researches on wireless waves), who found that when ultra-violet light (*q.v.*) was directed on a spark gap the electric discharge occurred at a lower voltage. In 1888 Hallwachs found that a body charged with negative electricity could be discharged by directing a beam of ultra-violet light on it. The nature of this curious effect was explained by Lenard and J. J. Thomson following the discovery of the electron by the latter. The facts that the emission of electrons begins immediately the light falls on the metallic surface, and that the maximum speed of the ejected electrons depends only on the wave-length of the light falling on the surface, were explained when Einstein applied the quantum theory to the problem. A simple type of photo-electric cell is shown in the diagram. It is a small glass cell coated on the inside with a deposit of potassium or other alkali metal, distilled into the cell while the latter is highly evacuated. The surface near E is left quite clear of the metal. A trace of the inert gas argon is then introduced and the cell is sealed off. R is a thin metal ring connected to the pin D, and the metallic deposit is connected by a wire to the pin A. B and C are 'dummy' pins fixed in the base of the mount so that the cell may be held in an ordinary valve holder. An alkali metal is used because, other things being equal, the photo-electric effect is greatest with these metals in ordinary light. The ring R is kept at about + 150 volts relative to the film, so that the electrons flow from it to the ring. The electric current so caused is very minute, but it can be amplified by means of an ordinary wireless valve and the amplified current can be made to operate

a relay that acts as a switch in an electrical circuit. The photo-electric cell when coupled up in this way behaves like an automatic eye. Photo-electric cells are now used, for example, to switch on the lamps in large buildings and station goods yards whenever the intensity of the daylight falls below a given level. They are used as burglar alarms, operating the bells when a beam of light falling on the cell is interrupted. Similarly, they are used extensively in counting machine units, recording each unit on an illuminated board as it passes in front of the cell. As these cells are sensitive to changes in the colour of the light falling on them they are used



for such purposes as detecting atmospheric pollution; rejecting discoloured peas en route for bottling; rejecting proprietary articles that have accidentally shed their labelled wrappers; for the automatic opening of doors when a person approaches and for closing them afterwards. But the most important application of the photo-electric effect so far is the invention of talking films (see CINEMATOGRAPH). Such films, as the *Electrical Review* gave details from time to time of the newest applications of P.-E.

Photogrammetry, science of measuring and surveying by aid of photography with a rigid camera and stand and a lens free from distortion and a fixed vertical position of the plate with regard to the lens. The size and arrangement of objects in the negative will bear a constant ratio to those of the original subject. The camera for photogrammetric purposes is generally provided with levelling screws and a graduated circular scale at the base, while four fixed points are arranged at the back to register on each plate exposed the position of the horizontal line and of the lens axis. A magnetic compass and a theodolite are usually attached to the camera.

Photography the recording of light-images by means of light sensitive substances.

History and Methods.—In 1826 Thomas

Wedgwood, son of Josiah Wedgwood the potter, pub. an account of experiments carried out by Sir H. Davy and himself in a method of copying paintings on glass and of recording profiles by the action of light upon silver nitrate. But these images could not be fixed as the unaffected portion of the emulsion was not removed. In 1811 Niepce obtained images on a bituminous film. Later he experimented with Daguerre (q.v.), and six years after Niepce's death (1839) the latter pub. particulars of his Daguerreotype process in which a metal plate coated with silver iodide was exposed in the camera and subjected to vaporised mercury in a dark room. A positive image was produced direct darks and lights in the subject so recorded. The Daguerreotype was the first practical process, and produced excellent results, but it bears little historic relation to present day processes, which have more directly evolved from the work of Fox Talbot an Eng. contemporary of Daguerre. Fox Talbot pub. (1839) particulars of his first process a method of photogenic drawing with the image produced on paper coated with chloride of silver and fixed by solution of silver chloride and potassium bromide. Later hyposulphite of soda became generally used to dissolve out the unwanted silver and so to 'fix' the image. In 1841 Fox Talbot patented his Talbotype or Calotype process. Fox Talbot's processes resulted in a negative image (darks and lights in the subject reversed) on paper. A positive print was obtained by printing through this negative on to another sheet of sensitised paper. The development since Fox Talbot's time has been rapid. J. B. Keade proposed a *develop* (c. 1842) to increase the effect produced by light. In 1845 Niepce de St. Victor suggested glass with a coating of albumen to replace paper for negatives. In 1851 Le Gray and Scott Archer separately proposed the use of collodion as a vehicle for the sensitive salts, the latter publishing an account of his collodion wet plate process. The collodion process was an excellent one. It is used largely to day with little alteration by process engravers. But the plate had to be exposed while the emulsion was still wet. In 1871 Dr. R. F. Maddox used a gelatine emulsion to hold the silver bromide salts and this could be dried after coating and before exposure doing away with the need for a portable dark room. The dry plate was improved in sensitivity and other qualities. In 1899 George Eastman placed on the market the first roll-film, celluloid taking the place of glass, and in 1891 he introduced a daylight loading film. From this P. as a popular hobby may be said to date. Recent improvements in sensitive materials have largely been in increased sensitivity and in the improved rendering of coloured objects in monochrome. The early emulsions were sensitive only to light of short-wave lengths, blue, violet, and the invisible ultra-violet. Such colour-blind emulsions are still made, and plates coated with them are known as ordinary.

By the addition of certain sensitising dye-products emulsions can be made sensitive also to yellow and green (orthochromatic) and, in addition, to red (panchromatic). Most emulsions are still unduly sensitive to blue light, and filters are used to correct this imperfect sensitivity or to emphasise or minimise the relative brightness of coloured objects when reproduced in monochrome. A yellow filter on the lens will darken a blue sky and thus show up the whiteness of clouds. Considerable penetration of haze can be effected by the use of suitable filters and under certain conditions the use of filters can reveal in a photograph details invisible to the human eye.

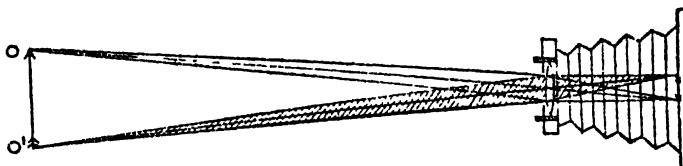
The camera, essentially a light-tight box with lens at one end and a place for the sensitive plate or film at the other, was developed from the camera-obscura (q.v.). Modern developments have been largely in the direction of compactness and in the lenses fitted. Simple lenses, those composed of a single glass, have a number of defects when used for P. Chromatic aberration, the bringing into focus of light of different colours at different distances from the lens instead of on one plane, is corrected by cementing together two lenses made of different glasses: this is the Meniscus Achromatic. As only the central area of a single lens gives a sufficiently clear out image, a 'stop' is used to cut out the edges. This causes distortion the form depending on whether the stop is behind or in front of the lens. By placing a lens on each side of the stop, the two distortions balance and an undistorted image is produced. Such a double lens is known as a rectilinear. Three aberrations remain: spherical aberration, the production of an image slightly unsharp all over unless only a small central area of the lens is used; curvature of field, the tendency in simple lenses to bring objects into sharp focus in a curved field, not on a flat one, such as is provided by plate or film, and astigmatism, a complex fault making it impossible to focus sharply at the same time vertical and horizontal lines. A high degree of correction of these aberrations is found in the anastigmat lens, often a combination of up to eight different elements, the practical advantage of which is the sharpness of the images produced even when practically the whole area of the lens is used. With such a lens far more light is passed to the film during a given period than when a small stop has to be used to cut out the uncorrected rays from the edges of a simple lens.

In the early days it was the usual practice to take a negative of the size in which the finished print was required. To-day, owing to production of precision cameras and the more critical definition of the modern anastigmat lens and the finer grain of negative-making materials, small negatives are commonly taken and enlarged prints made by projecting an enlarged image of the negative on to sensitive paper. This has led to a vogue called miniature P. with a 'press' of its own. The sensitive paper used for

enlarging has an emulsion similar to that on films or plates, but not so speedy; this is bromide paper. Prints of various colours can be produced by using chlorobromide papers, the emulsion of which is a mixture of chloride and bromide of silver, the ratio of the two halides determining the colour and speed. Multi-grade is a modern bromide paper with unique characteristics. Two emulsions, one soft in gradation, the other contrasting and sensitised to blue-green light, are coated on to a single base. The use of suitable filters in printing or enlarging can be made to alter the contrast of the result. Gaslight paper is less sensitive, and can be worked in dim artificial light, and no dark room is necessary. The Bromoil process favoured by many pictorial photographers is based on a print on bromide paper. The image is bleached in a solution which transforms

produced in the U.S.A. It is the Land one-minute camera and is made to take two spools, one of negative and one of positive paper. After exposure the ends of the two spools of paper are pulled out together to a predetermined stop and as they pass between two rollers in the camera a narrow bag of paper extending across the positive paper is burst. The bag contains the processing solution which is squeezed into close contact with the exposed negative paper. The unused silver compounds diffuse or migrate to the positive paper, there to be reduced by the solution to form a positive image. The finished quarter-plate print can be removed from the camera a minute after the operation has commenced.

Colour Photography.—As early as 1785 Sennebier pointed out that when a spectrum was thrown on to silver chloride violet and blue were reproduced. In



THE PRINCIPLE OF THE CAMERA

OO' is the object. The convex lens of the camera is pulled out so that it forms a real, inverted image II' on the sensitive plate PP. Thus by varying the distance of the plate from the lens it is possible to form images on the photo for various positions of the object.

It from one of various degrees of light and dark to one of various degrees of stickiness. The print is then dabbed over with pigment, which adheres in various degrees, according to the stickiness of the various parts, and the tones of the picture are thus reproduced in pigment; considerable latitude is possible in the building up of the pigment image. Bromide and gaslight are development papers, the process being to expose, develop, fix (to remove the undeveloped sensitive salts) and wash, as in making negatives. Other printing papers are known as print-out papers, because the image is printed out to its full depth, the print being finished by toning to the desired colour and fixing; with self-toning printing-out papers toning and fixing are combined. In platinotype paper the image is formed of metallic platinum; the paper is expensive, but the results are of exceptional quality and permanence. Carbon printing depends upon the hardening of dichromated gelatine on exposure to light; the image is of carbon pigment in gelatine, those portions of the imprugated gelatine which have not been hardened by light action are washed away by the application of warm water. An image similar to that of a carbon print, but not necessarily pigmented, can be used as a resist in etching designs, etc., on to metal or glass.

A camera with unique features has been

1812 in his book *Zur Farbenlehre*, Goethe printed an account of the researches of Seebeck, the great Götting physicist, into the action of coloured illumination upon silver chloride. During the next eighty years investigations were conducted along these lines by many famous men, including John Herschel, Hunt, Niepce de Saint Victor, Poitevin, Becquerel, Zanker, and Wiener.

In 1891 Lippmann gave an explanation of the theory of interference and exhibited actual photographs of colours produced by his method. Lippmann used a transparent gelatine emulsion of silver bromide exposed in contact with a mercury reflector. The light passing from the subject through the emulsion was reflected back along its path by the reflector. Where two trains of light-waves interfered the emulsion was unaffected, but where they reinforced each other a series of planes of metallic silver was produced on development, and the distance apart of these planes depended on the wavelength of the light. The result, when viewed at the angle of maximum reflection, was a photograph in colours corresponding to the actual subject. The systems in use to-day are indirect and based on the Young-Helmholtz theory that all colours may be matched for the human eye by mixing in various proportions light of the three colours, blue, green, and red. There

are two main systems, the additive and the subtractive.

In the additive processes three negatives are exposed through red, blue, and green colour filters respectively. Positive transparencies are made from these and each projected through a filter of a colour similar to that used in exposing the corresponding negative, all three images being combined or added to each other in register on a screen as demonstrated by Clerk-Maxwell in 1861, or viewed in a device which combines all three images in an eyepiece (Cross, 1879; Ives's Krömsköp, 1902). The most widely used of the additive processes were the screen plates or films, 1896; Autochrome, 1907; Warner-Powrie, 1907; Omnicolor, 1907; Thames, 1908; Paget, 1913; Agfacolor, 1924; Finlay, 1929; Dufaycolor Roll Film, 1935. This method used a mosaic of blue, green, and red filters on a glass plate or film support. A panchromatic emulsion was coated on to the mosaic; the plate was exposed so that the light passed through the mosaic to the emulsion; the plate was then processed by reversal to a positive and could then be viewed by transmitted light or projected on to a screen. In the Autochrome the mosaic was made of dyed starch grains. The Paget process employed a separate taking screen, and from the resulting negative a positive was made and bound up in register with a viewing screen.

In 1869 Louis du Flauron proposed the subtractive method in which the positive images from separation negatives made through red, blue, and green filters were converted into a dyed or otherwise coloured image, complementary in colour to that of its taking filter, the amount of colour being proportional to the amount of silver developed in the positive. The colours used are known as subtractive or complementary: thus the positive from the negative taken through red filter is coloured blue-green, the positive from the green separation negative is coloured magenta, and the positive from the blue separation negative is coloured yellow. When these coloured positives are superimposed a colour print or transparency is produced which may be viewed either by reflected or transmitted light.

Sanger-Shepherd (1900) used gelatine-coated film sensitised in potassium dichromate to hold his dyed image. Pinotype (1905) was a similar process. In the two-colour Kodachrome film (1914) two colour-separation negatives, exposed through red and blue-green filters respectively, were developed and treated in a ferric chloride bath which bleached the image and simultaneously softened the gelatine adjacent to each particle of silver. These softened areas were stained in blue-green and orange dyes and the images bound in register. The method was adapted to cinematography by making the prints in register on each side of a double-coated film. Kodachrome film (1936) uses three-emulsion layers on a film support. The top layer is sensitive only to blue light, the middle layer records the green, and

the bottom layer the red. After development to a negative the residual silver bromide in each layer is exposed and independently developed in coupler developers. Coupler developers deposit dye of predetermined colours wherever they develop silver bromide to silver. Different coupler developers are therefore used for each layer, and when the positive silver image is dissolved away a subtractive colour photograph built up from a yellow, magenta, and blue image results. The Agfacolor process (1936) seems similar, but the three coupling components are included in the three layers during manufacture. Technicolor (1934 and 1938) (*q.v.*), much used in cinematography, is a three-colour imbibition process employing three-colour separation negatives made simultaneously in a special 'beam-splitting' camera. Ilford Colour film 'D' (1918) is an integral tripack process which does not carry colour-formers and must therefore be laboratory processed. Gevacolor (1948) is a multilayer colour transparency material of the reversal and colour development type. Kodak Ektachrome film is a reversal processed sheet film in which the coupler components of the dyes are incorporated in the emulsion layers during manufacture and a single-colour developer serves to produce all three positive dye images. Ferranicolor (1919), a process developed in Italy, seems to have some affinity with Kodacolor (1942).

Of the subtractive colour processes producing prints on paper the most successful have been Three-colour Carbro (1902) in which carbon tissues, yellow, magenta, and blue, are sensitised in dichromate, dried, and exposed through the three appropriate separation negatives. After development in warm water the three dye images are superimposed in register on a final support. Three-colour Carbro uses three bromide prints made from the three separation negatives. These are squeezed into contact with yellow, magenta, and blue carbon tissue which has been sensitised in dichromate and ferricyanide. The silver image is reduced and reacts with the dichromate producing local hardening. Washing away the soluble gelatine leaves dye images which are superimposed on to a final support. Vivox (1932), a modified form of Carbro, was a largely used commercial process. Kodak Wash-off Relief (1931) used bromide prints on a safety-base support. After exposure behind the three separation negatives through the safety-base support the images were developed and the image bleached with simultaneous hardening of the surrounding gelatine. Soluble gelatine was removed with warm water leaving hardened reliefs. These were soaked in dyes of complementary colours to the taking filter used in making the negative. The dye images were transferred under pressure from the reliefs to a mordanted gelatine-coated paper, the three superimposed images producing a colour print. The improved dye-transfer process (1916) used a tanning developer for the reliefs. Dufaycolor (1938) was a modified carbon

process. Dufay tissue (1945) was a Carbo process using printing material with a cellulose acetate base. In the wet carbon process (1944) carbon tissues are exposed whilst still wet behind separation negatives. Minicolor (1941) and Kotavachrome were designed for the mass production of colour prints from Kodachrome transparencies. Both processes use three emulsions coated on an opaque white safety base. Kodacolor Roll Film 2 (1942) was an integral tripack on roll-film support in which the coupling compounds used to produce the dye image were included in the emulsion. A single developer was used, and when the negative silver images were reversed a negative dye image in colours complementary to those of the subject was left. The negative was printed on to paper carrying a similar set of emulsions, and after similar processing a positive colour photograph was obtained. Very beautiful 'metal-chrome' colour prints were exhibited during 1949.

Infra-red Photography, see *INFRA-RED RAYS*.

See also *CIRONO-CHROME*; *CINEMATOGRAPHY*; *LENS*; *LITHOGRAPHY*; *PHOTOGRAPHURE*; *PHOTOMIC GRAPHY*; *TECHNICOLOR*.

See J. Mitchell (ed.), *Iford Manual of Photography*, 1900, 1942; J. M. Eder, *History of Photography*, 1905, 1915; B. T. J. (Glover) *Perfect Negatives*, 1923, 1948; F. J. Jordan, *Photographic Control Processes*, 1937; S. G. Bayland Stubbs, F. J. Mortimer, and G. S. Malthouse (associate editors), *The Modern Encyclopedia of Photography* (2 vols.), 1937-38; and C. I. Jacobson, *Enlarging*, 1939, 1942.

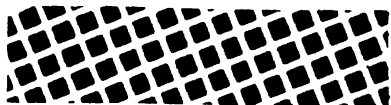
JOURNALS: (weekly) *British Journal of Photography* (1860) and *Amateur Photographer* (1918); (monthly) R.P.S., *Photographic Journal* (1833); *Photography* (1932); and *The Miniature Camera* (1936).

Photogravure is an intaglio process; the ink which forms the printed image is retained in hollows in a metal plate or cylinders before being transferred to paper by means of pressure in a press. There are two kinds of P.: (1) that which is printed from a plate; (2) that which is printed from a cylinder. Plate printing can be further subdivided into (a) the kind where the continuous tone of the original picture is split up into a multitude of dots by means of a screen very similar to the one used for making half-tone blocks (see *PROCESS WORK*) and (b) where the tone is split up by means of a grain not unlike that of aquatint (*q.v.*).

Plates can be printed in two ways. The first by means of a platen similar to that of a letterpress machine. In the second method a thinner plate is employed which is bent round a cylinder and printed in the same way as a solid cylinder. More typical of P. is the method of using a cylinder which is particularly economical for long runs. The cylinder has an iron or steel core on which a shell of copper is deposited by revolving the cylinder in a tank of copper sulphate through which an electric current is passed.

The course of one particular method employed for the production of a popular

magazine may here be followed. While the reading matter is being set in type, paper negatives are made of the pictures, and the type, when correctly set, is printed with almost white ink on a shiny black paper, and dusted with white powder which sticks to the printing and intensifies the image. This is in effect a negative. The negatives of the pictures and the negatives of the type are pasted together in correct relation to one another, forming one negative of the whole page. The complete negative is then photographed on a film resembling that used in a normal snapshot camera, but a little thicker. The result is a positive, which is an exact image of the page as it will appear when printed.



Sun
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PHOTOGRAPHURE SCREEN AND CELLS

Above. Portion of a screen magnified 23 times. The white lines assist in forming the walls of the cell which retain the ink on a cylinder.

Below. Diagrammatic cross-section of cell formation on a cylinder, magnified 23 times. The cells in the darkest shadows of an illustration (as A) are seven-eighths of one thousandth of an inch deep and those in the highest lights only about one-tenth of a thousandth of an inch.

The positives of the individual pages are then carefully 'planned' over a lay-out on a sheet of glass, so that the pages, when folded and trimmed, will fall in their correct sequence. It should be remembered that the negatives just referred to are of opaque paper, while the positives are made of transparent film.

The sheet of positives is now ready for transferring to the copper cylinder and is done by means of carbon tissue. Carbon tissue is paper coated with gelatine and made sensitive to light. It is 'squeezed' on glass and when dry stripped off. This tissue is exposed to light behind a screen. The screen used is different from that used for making a normal letterpress half-tone block, being composed of a lattice work of white lines that leave tiny squares of black between as in the diagram. Immediately after printing the screen, the sheet of positives is printed on the same tissue, which therefore has a combined image composed of the picture and a superimposed network of white lines. The object of the screen is to split up the image into an immense number of square cells which will later be etched. The tissue is squeezed on the copper cylinder and then soaked in hot water which enables the paper backing to be peeled off. This gelatine image will vary in thickness

according to the amount of light which penetrated through the positive when it was printed. After carefully protecting the margins and any parts of the cylinder not required to print, it is etched. The result on the copper will be a multitude of square pits of depths varying according to the tone of the original. The process is carried out by slowly revolving the cylinder in a trough while the etcher pours the solution over it from jugs, using different strengths to suit the differing needs of the various pictures and type. A very large number of prints could be taken direct from the copper, but nowadays it is more general in rotary P. to face the cylinder with chromium before printing.

The printing is effected by the cylinder revolving in a trough of ink (or in contact with a roller which revolves in the ink), and as the ink is drawn above the surface of the trough a thin steel blade (the 'doctor'), which is in contact with the cylinder along its whole length, wipes all superfluous ink from the surface. Continuing its revolution the cylinder is brought into contact with the paper by means of a rubber-covered cylinder. The pressure is sufficient to withdraw the ink from the pits in the cylinder and transfer it to the paper.

P. is a process particularly useful for printing photographic originals in very large numbers at very high speeds. It produces a particularly rich effect from rather dark subjects. This is largely due to the fact that the dark tones in gravure carry more ink than in the light tones.

Colour Photogravure is employed in many periodicals and magazines. The method of reproducing from a coloured original by P. is on conventional lines and is similar to that which is used for three- and four-colour letterpress half-tone. The coloured original is photographed three times through a different coloured filter, i.e. a violet filter for the yellow plate; an orange filter for the blue plate; and a green filter for the red plate. The negatives which are produced correspond to the colour values of the original, but a certain amount of retouching is necessary to correct the balance of colour. A positive is made from each of the negatives, which when made up into sheet form is ready for transferring to the copper cylinders. The process follows as for monotone reproduction but four cylinders are required for a four-colour reproduction. After etching, the cylinders are ready to go on the printing press and the paper reel is fed through the machine. After each colour is printed, the web progresses through the machine over steam-heated drums, which makes the colour perfectly dry before a subsequent printing takes place. The periodical is produced at approximately 25,000 copies per hour, the machine actually making 12,500 revolutions per hour, producing two copies at each revolution.

Flat Plate Hand Gravure is a process not much used now. It does not fail to produce first-class results, but it is slow and therefore costly. The plate is prepared as for an aquatint, by covering it with a dust

of bitumen or resin which is made to adhere to the plate by slight heating. A carbon tissue of the desired picture is prepared as described earlier and laid on the plate and etched. No screen, of course, is used, as the dust-grain breaks up the image into an infinite number of cells. If inked and wiped and printed by hand, exquisite results can be obtained. This process is appropriate for limited eds. of plates for use in books, and for producing high-quality reproductions of works of art. If the paper is damped, even hand-made paper is practicable, which improves the quality enormously for some kinds of work. See H. Biskoborn, *Photogravure Machine Printing*.

Photo-lithography, see under LITHOGRAPHY.

Photometry, experimental comparison of the illuminating power of different sources of light. It attords a method of measuring this illuminating power by comparison with that of a conventional standard. The standard adopted was originally the illuminating power of a sperm candle, six to the pound, burning at the rate of 120 grains per hour, the illuminating power of any source being then expressed as equivalent to so many standard candles. This standard is too inaccurate for modern work, owing to the varying illuminating power of these candles. Sev. standards have been suggested, among them being the portion of a certain size flame of an Argand burner, the flame of amylacetate contained in a special lamp, and the pentane lamp. The latter is by far the most accurate. It consists of a flame of pentane vapour, mixed with a definite proportion of air, and burning in a special type of lamp, the ring burner of which is made of stentite. This lamp is equivalent to ten standard candles. The instruments used for carrying out these comparisons are called photometers. The simplest photometers are those of Foucault, Rumford, and Bunsen. The Foucault photometer consists of a semi-transparent screen fixed at right angles to an opaque partition, which can be moved in its plane perpendicular to the screen. The two sources of light to be compared are placed one on each side of the screen, their distances from the screen being adjusted until each half of the screen is equally illuminated by its corresponding source; the illuminating power may be then compared according to the inverse square law (see LIGHT). The Rumford photometer effects the comparison by adjusting the intensities of two shadows of a vertical rod thrown on a screen by the two sources. The distance of the sources from the screen are adjusted until the shadows have the same intensity. The positions of the sources are also adjusted so that the shadows are cast side by side on the screen to facilitate the comparison. By applying the inverse square law the illuminating powers may be deduced. Bunsen's grease-spot photometer consists of a screen of opaque paper with a grease spot at its centre. If a source of light be placed in front of this screen, and viewed from the remote side, the grease

spot will appear brighter than the rest of the screen, while it appears darker on the other side. When two sources are to be compared they are placed one on each side of the screen and their distances adjusted until the spot appears the same on both sides. These distances are then measured, and the inverse law applied. In their simple forms the above types of photometer are not used to day, but the Lummer Brodhum photometer is an adaptation of the Bunsen. It consists essentially of an opaque disk, part of which is illuminated by one source while the remainder is illuminated by the other. The instrument is so arranged that both sides may be seen at the same time and their respective brightness compared. Thicker photometers have a white surface which is alternately illuminated by two sources. If the sources are so placed that they illuminate the screen unequally a flickering effect is produced. The distances of the sources from the screen are then adjusted until this flickering vanishes when the ordinary inverse square law is applied. In all this work external lights should be excluded and all the light from the sources should be transmitted in the same direction. Further all the lights should be of the same colour otherwise the equality of illumination will be difficult to determine owing to this difference in colour. It is generally found that different sources emit different coloured rays in different proportions so that to obtain a really accurate result the light from each source should be split up into a spectrum and each corresponding part of these spectra should be compared in turn. The direct use of the flicker photometer gives results which differ very little from the results obtained by spectra comparison. A further difficulty arises in practice because lamps in ordinary use emit unequal amounts of light in different directions so that the measurement of the light emitted in one direction may afford a misleading estimate of the total. While it is possible to make measurements in so many directions relative to the lamp that a satisfactory average is obtained the process is tedious, and the diffusing sphere is usually employed. This is a large sphere coated internally with a white powder with a portion shielded from the direct rays of the lamp placed inside the sphere; the brightness of the shielded part depends upon the total amount of light emitted from the lamp and provides a measure of it.

Photomicrography, production by photographic means of enlarged pictures of microscopic objects, as contrasted with microphotography which produces minute prints requiring microscopic examination from objects of normal size. The former practice is of the utmost utility in many branches of science and is capable of yielding results of great artistic virtue, the latter was once fashionable as a scientific curiosity and has achieved utility as a means of recording printed matter in small compass for transit or storage. The general optical considerations are treated under MICROSCOPY AND

MICROSCOPY: main peculiarities of P from the practical point of view are that a higher degree of resolution can be attained than by visual microscopy as the blue and ultra violet rays can be used but that the observer of the photomicrograph is deprived of the information to be gained from alterations of focus the picture represents an optical section of a finite thickness that cannot be extended by ocular accommodation or mechanical adjustment, and the picture is thus less informative than the direct image although it can be studied at leisure and discussed or duplicated.

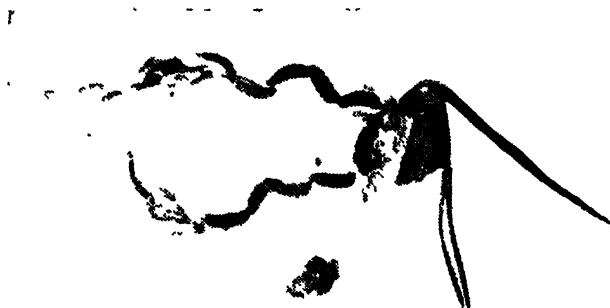
Photographic recording was used as soon as it became available the daguerreotype process being employed and before 1880 the use of wet collodion plates for P was well known although the lack of convenient light sources restricted technique. The introduction of suitable dry plates is recorded in 1882 and these by their convenience and instant availability quickly ousted the wet plate. Nevertheless until recently the wet plate was unsurpassed for resolution owing to its freedom from grain. The technique in common use has changed little since the early days the greatest advances having been made in the light sources available and in the sensitivity of the photographic plates. The apparatus consists essentially of a suitable microscope arranged to project a magnified image on a sensitive photographic plate but there is a modern tendency for complete instruments to be designed making the means by which the ultimate refinements of critical adjustment can be made these are excellent for routine use but are incapable of yielding the results possible with less highly integrated apparatus.

Advances in P have been made possible by the introduction of plates for use in the infra red region to exploit local transparency of normally opaque substances or to secure differentiation by selective absorption. Ultra-violet P has been used since 1904 to gain additional resolving power although the development of a practical process dates from 1921 when Barnard and his colleagues developed suitable apparatus, monochromatic radiation segregated from electric spark discharges is utilized for illumination. P in the near ultra violet to excite fluorescence and to provide sensitive absorption pictures has become a commonplace in every laboratory owing to the development of mercury discharge lamps.

The most distinctive photographic branch of P is that one now termed 'cinemicrography' which produces films for projection. Apart from directly recording microscopical events it can be used to obtain slow motion pictures of movements too fast to follow by eye and also to convert imperceptible changes into a visible sequence. The extreme high speed photography possible on a large scale is limited in microscopical practice by the light intensity available or tolerable to the specimen, its main application promises to be in physiology at the other end of the scale 'time lapse' photography, in which the successive exposures

of the film are made at intervals of seconds or hours, has proved very useful in research; nuclear division, tissue growth, cell feeding, and similar slow processes can be photographed, and projected at increased speed, with the result that the processes acquire an easily appreciated significance; the same action may, moreover, be observed repeatedly by many observers. It is notable additionally that, even in the absence of 'phase-contrast' (see MICROSCOPES AND MICROSCOPY) certain regions in the cells, which would not be identified in normal observation, can be differentiated owing to the movements of the almost imperceptible shadows. A further application of the cinematic technique is the reconstruction of a specimen

its possibility was announced (1878) by Graham Bell, of telephone fame. The instrument depends on the peculiar properties of selenium, though hard indiarubber, antimony, and other substances will act. Crystallised selenium is very sensitive to light and its resistance to an electric current varies with the intensity of light. The transmitter is a plane thin silvered mirror so fixed to a tube as to vibrate with sound such as speech. A beam of light is concentrated on this by means of a lens, so that the rays are reflected parallel. The receiver is a parabolic mirror unconnected with the transmitter, with a selenium 'cell' at the focus; this is placed in series with a battery and telephone receiver. The



GENITALIA OF
FEMALE HOUSE-
FLY
X 10

1/2 No. 1 objective,
no eyepiece.
Illumination by
Kohler's system.

W. G. Hartley

by projecting a film made by photographing serial sections of it in sequence, so that the observer can see the relationships of the various parts as he is conducted through the specimen; this might be considered as providing P. with the third dimension which it lacks in comparison with visual microscopy. The modern technical practice is to use sub-standard (16-mm.) film for cinematography, as the definition can be maintained, whilst the problems of illumination, and of moving and exposing the film without vibration, are greatly eased.

The practical details of P. can be learned only by experience; books on the subject are J. E. Barnard and F. V. Welch, *Practical Photomicrography*, 1936; R. M. Allen, *Photomicrography*, 1941; and C. P. Shillaber, *Photomicrography*, 1945.

Photon. Although light and other electromagnetic radiations travel through space as a wave motion, they interact with matter as though they were discrete particles or quanta of finite energy (see LIGHT; X-RAYS, Compton Effect; QUANTUM THEORY; PHOTOELECTRICITY). To emphasise the particle aspect of quanta, they are sometimes referred to as *Pa.* or particles of light; cf. electrons (particles of electricity), protons, neutrons, etc. (particles of matter of various kinds).

Photophone. Instrument for transmitting sounds by means of a beam of light;

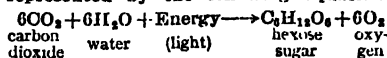
selenium cell is composed of alternate disks of brass and selenium. The rays of light falling on the transmitting mirror are scattered by its vibrations, so that they vary in intensity on the focus of the parabolic mirror, which causes the resistance of the cell to vary; the varying current actuates the telephone receiver.

Photo-sensitive Glass, see under GLASS, Coloured Glass.

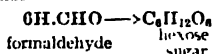
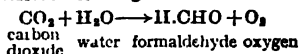
Photosphere, white-hot radiating surface of the sun. The surface presents a mottled appearance. Langley and Janssen compared these appearances to 'rice grains,' computing their diameters at nearly 400 m. Langley regarded them, although what they are is still doubtful, as the tops of long columns in which the heated matter from the sun's interior rises to the surface. Hansky and Chevalier showed that these granules moved with a velocity of 5 m. to 20 m. per second. The temp. of the visible surface of the sun has been computed by sev. observers, the results varying from 6000° to 10,000° C.

Photosynthesis (Gk. *photo*, light; *synthesis*, a building up), or **Carbon Assimilation**, the production of carbohydrates (sugar and starch) in the green leaves and other green parts of plants under the influence of light. The raw materials for the synthesis are carbon dioxide, which diffuses through the stomata of the leaves from the atmosphere (or through

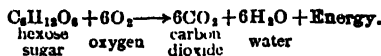
the epidermis from the surrounding water in aquatic plants), and water absorbed from the soil through the roots. Energy is necessary for the reaction, and is supplied in nature by sunlight, though a powerful artificial light is also effective, as is illustrated for instance by the capacity of green plants to flourish under electric light in the caves at Cheddar, Somerset. The first recognizable product of P. is a hexose sugar, $C_6H_{12}O_6$, such as glucose, and the reaction may then be represented by the following equation:



The production of oxygen as a by-product of P. will be noted, and is referred to below. The hexose sugar may be secondarily converted into cane-sugar and into starch. The latter being insoluble is an economical form for the temporary storage of carbohydrate in the leaves, but in some plants such as the onion the carbohydrate remains entirely as sugar. The reaction is certainly more complicated than is indicated by the above equation, and it is widely held (though still unproved) that formaldehyde is an intermediate product which then polymerises into sugar:



The polymerisation can readily be demonstrated *in vitro* if formaldehyde solution is subjected to the action of alkalis. It can easily be shown by experiment that P. takes place in green organs only, i.e. those which contain the pigment chlorophyll, and will not occur for instance in the white parts of variegated leaves. It seems that chlorophyll functions as a catalyst by combining temporarily with carbon dioxide and water, and promoting their conversion into formaldehyde. The importance of P. in the living world is that it provides a source of carbohydrate and other organic material by green plants, and also indirectly by non-green plants such as fungi as well as by animals, for building up their bodies and as a source of energy when it is oxidised during respiration. The equation for respiration is the reverse of that for P., and serves to indicate that the energy of all living organisms is ultimately derived from the sun:



In addition P. prevents the depletion of atmospheric oxygen resulting not only from respiration but also from such processes as combustion, decay, and fermentation. Without P. the life of all ordinary plants and animals is inconceivable; a few bacteria are able to perform *chemosynthesis* and to build up

their bodies using chemical energy instead of sunlight.

Phototropism (Gk. *φως*, light; *τροπή*, a bending or turning), or **Heliotropism** (whence the name of the plant *heliotrope*), the bending of a plant organ (e.g. a stem) in response to the stimulus of light so that the organ becomes orientated in a definite direction with respect to the direction of the incident light. Stems, coleoptiles (stem sheaths of grasses), and flower stalks bend towards the incident light, as is noticeable when plants are grown in window boxes, and are therefore said to be positively phototropic; some roots are negatively phototropic, bending away from the light (though most roots are insensitive), whilst leaf blades usually turn at right angles to the light. P. should be distinguished from phototaxis, which is a movement of a whole organism (such as a motile alga or an animal) towards or away from light; also from photonastic responses, such as the 'sleep' movements of flowers and leaves, which bear no relation to the direction of the light. The positive P. of a stem or other organ is evidently caused by the side towards the light growing at a slower rate than the side away from the light, so that a positive curvature results. Decapitated coleoptiles do not respond, and it has been shown that the tips of the coleoptiles contain a growth-stimulating substance (hormone) whose distribution to the illuminated side is retarded, causing it to grow more slowly than the other. P. is of obvious value in enabling the organs of plants to carry out their functions efficiently.

Phototype, see COLLOTYPE.

Phraates, name of four kings of Parthia:
Phraates I. subdued the Mardi.

Phraates II., son of Mithridates I., defeated and slew Antiochus VII. (Sidetes), 128 B.C., but was himself overcome in battle soon afterwards by the Scythians and his army destroyed.

Phraotes III. lived at the time of the war between the Romans and Mithridates of Pontus. He took no part in the war, although he formed an alliance with the Romans, but at a later period he invaded Armenia, and incurred the displeasure of Pompey. He was murdered by his two sons.

Phraates IV. was renowned for his cruelty, which eventually produced a rebellion against him. He was driven out of the country, but restored by the Scythians. He was poisoned in A.D. 2.

Phragmites, see REED.

Phrase, in music, a succession of sounds either in melody or harmony, forming a definite melodic or thematic feature, and terminating in a pause (*repos*), that is, a comparatively long note or a rest, thus forming a cadence more or less perfect.

Phrenology, pseudo-science based on the assumption that 'faculties' are localised in the brain, and that these areas are in evidence on the skull. Phrenologists profess to discover an individual's talents by locating these 'bumps' or areas. The bones of the cranium have thicknesses and air spaces producing exterior unevenness having no relation to the cortex

within; localisation exists (see BRAIN), but has no connection with external variations in the shape of the head. The subject was opened by Dr. F. J. Gall in 1796 in Germany, with a 'map' of thirty faculties. Spurzheim, G. and A. Combe, and Dr. Elliotson were the exponents in Britain. Phrenological societies sprang up in Britain about 1832, but strenuous opposers were found in Sir C. Bell, Sir W. Hamilton, Jeffrey, Brown, Brougham, etc. The subject has since then been in ill repute among doctors and scientists, though in 1901 Dr. Bernard Hollander pub. *The Mental Function of the Brain, or the Revival of Phrenology*, in which he collects a large number of instances where similarly placed lesions of the brain produced similar effects in character. He considers the case for localisation scientifically estab., but is wary in extending his support to external 'bumps.' See G. Combe, *Essays on Phrenology*, 1819; J. Fowler, *Practical Phrenology*, 1846; A. Bain, *On the Study of Character, including an Estimate of Phrenology*, 1861; J. P. Blackford, *Phrenology for Students*, 1916; J. Coates, *Phrenology*, 1920; and the *Phrenological Journal*, 1824, et seq., and works cited under GALL, FRANZ JOSEPH.

Phrygia, country of Asia Minor, which was of different extent at different periods. Under the Rom. Empire P. was bounded on the W. by Mysia, Lydia, and Caria, on the S. by Lycia and Pisidia, on the E. by Lycania (which is often reckoned as a part of P.) and Galatia (which formerly belonged to P.), and on the N. by Bithynia. The Phrygians are mentioned by Homer as settled on the banks of the Sangarius, where later writers tell of the powerful Phrygian kingdom of Gordius and Midas. It would seem that they were a branch of the great Thracian family originally settled in the N.W. of Asia Minor as far as the shores of the Hellespont and Propontis, and that the successive migrations of other Thracian peoples, as the Thyni, Bithyni, Mysians, and Teucerians, drove them further inland. P. was conquered by Cressus, and formed part of the Persian, Macedonian, and Syro-Grecian empires; but, under the last, the N.E. part was conquered by the Gauls, and formed the W. part of Galatia, and under the Romans was included in the prov. of Asia. The earliest Gk. music, especially that of the flute, was borrowed in part through the Asiatic colonies, from P. With this country also were closely associated the orgies of Dionysus and of Cybele, the Mother of the Gods, the *P. Mater* of the Rom. poets. After the Persian conquest, however, the Phrygians became proverbial among the Gks. and Romans for submissiveness and stupidity. The Rom. poets constantly use the epithet Phrygian as equivalent to Trojan. The Thracio-Phrygian group of languages were Indo-European, but too little is known of them to fix their place in linguistic affiliations. Some scholars consider anet. Phrygian as part of a large group, termed Thracio-Illyrian, of which Armenian and Albanian are held to be remnants. See W. M. Ramsay, *The Cities and Bishoprics of Phrygia*.

(vol. 1.), 1895-97, and W. H. Buckler and W. M. Calder, *Monuments and Documents from Phrygia and Caria*, 1939.

Phrygian Mode, third eccles, mode, represented on the pianoforte by the scale beginning with the note E, played on the white notes. See also HARMONY: MODE.

Phryné (c. 340 B.C.), celebrated courtesan of anc. Athens, was the daughter of Epicles, and was born at Thespiae in Boeotia. Hyperides the orator, Apelles the painter, and Praxiteles the sculptor were among her lovers. She served as model for the 'Venus Anadyomene' of Apelles, and the 'Cnidian Venus' of Praxiteles.

Phrynichus (Φρυνιχός): 1. Attic tragic poet, was probably a disciple of Theopis. He produced his first tragedy in 511 B.C., or twelve years before Aeschylus (490), and is considered to be the first inventor of tragedy, for he put on the stage serious subjects illustrative of heroic deeds, and aimed at moving the passions of his audience, whereas Theopis made use of light, bacchanalian stories. Further he improved the poetical character of the drama and introduced dithyrambic choruses. He also was the first to use masks representing female persons in the drama. Herodotus (book vi.) relates that when his *Capture of Miletus* was exhibited on the Athenian stage the audience burst into tears, so moved were they by the vivid representation of the sufferings of a kindred people. He further relates that P. was fined 1000 drachmæ for producing the play, and that a law was passed forbidding it ever to be shown again. His last work was produced in 476. 2. (fl. 429 B.C.) One of the most distinguished poets of the old comedy, was probably the son of Eunomides. His writings are characterised by their elegance and vigour, and there is probably no ground for Aristophanes' attack on him in the *Frogs* for the use of low buffoonery. He is said to have invented the 'Tonie a Minore Catalectic' verse which was named after him. 3. Gk. sophist and grammarian, was probably a native of Bithynia. He lived in the reigns of Marcus Aurelius and Commodus, and is chiefly remembered for his *Σοφιστικὰ παρακρίματα*. He also wrote *Τὰ κυρία ῥήματα καὶ ὁρισματα Ἀττικῶν*, a lexicon of Attic words. See W. G. Rutherford, *Phrynichus*, 1881.

Phthalocyanines, pigments (mostly blue and green) remarkable for their fastness to light. The first of the series to be discovered was obtained by chancé during a process in a chemical works, but its intense colour led to systematic investigation, and other similar compounds were soon prepared and their structure ascertained. P's. are composed of four molecules of phthalonitrile, $C_6H_4(CN)_2$, attached to a central nucleus which may be two atoms of hydrogen or an atom of copper or other metal. The first to be marketed was Monastral Blue B (1935).

Phthiotis, dept. of Greece, S.E. of Thessaly (*q.v.*), and home of Achilles (*q.v.*). Pop (with Phocis), 219,400.

Phthisis, or Consumption, or Pulmonary Tuberculosis, progressive wasting disease

especially pulmonary consumption. It is widespread among the civilised nations, and has been introduced by them among the less civilised with dire results. Its widespread and infective nature has long aroused medical science, public opinion, and gov. action in providing sanatoria. The isolation of the tubercle bacillus by Koch in 1882 was one of the great triumphs of pathology. The bacillus is a minute, often curved, thread-like rod; when stained with fuchsin it retains its colour on treatment with mineral acid, while that of surrounding tissue is decolorised; its vitality is like that of other bacteria, great, resisting heat and cold, and is retained for some time in the dust of the dried sputum expectorated by phthisical patients; it is therefore of importance that it should be prevented from drying. That the human body is highly resistant to attack is shown by the number of cases of arrested disease, but a hereditary predisposition appears to be estab. In some persons, and any condition lowering the vitality predisposes to attack, e.g. alcoholism, syphilis, frequent child-bearing, prolonged lactation, and previous disease of the lungs. Deficient ventilation, overcrowding, insufficient or improper food, insanitary conditions, absence of sunlight, all favour attack, as do also the irritant injuries to the lungs produced by particles of dust in connection with various occupations such as mining, stone work, and grinding.

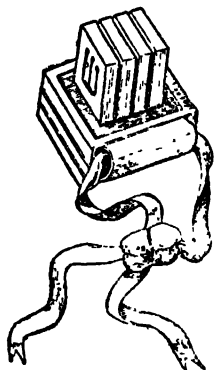
Symptoms.—Hæmoptysis, or spitting of blood, may occur at any stage, but denotes a serious stage. The temp. tends to rise towards evening and fall in the morning, and night sweats are common. Pain is not usually present except during an attack of coughing due to the softened parts of affected areas entering a bronchus; general pallor and emaciation appear with the characteristic hectic flush, and there is a steady decrease of weight. Pleuritic adhesions, dry pleurisy, are the rule, and frictional sounds may be detected; cavities and areas of consolidation round the tubercles alter the percussion note and breath sounds. The changes in the lung, including early stages, are best detected by an X-ray examination: miniature radiography on a large scale in factories, etc., is becoming increasingly common. The Mantoux test (similar to the tuberculin test in cattle) is positive.

Progress.—The first stage usually occurs at the apex of one lung, but is variable, in older people often occurring at the base. In the majority of cases it remains at one focus, fibrous tissue grows round, the patch dries up and often acquires a deposit of calcareous salts. The focus may be arrested but becomes active again. The alveolar tissue becomes inflamed, and catarrh is present, and the products cause a consolidated area of lung. The centre of the nodules may become caseous, while the inflammation spreads in the surrounding portions. As these coalesce a general softening takes place, and the matter collects in the bronchi, from which it is coughed up, leaving a cavity. Suppura-

tion may take place, the cavities unite and fill with blood and pus. The blood vessels may be injured and small aneurisms formed, and infection of the blood or lymphatics may carry the disease to other parts, thus hastening a fatal termination. In the acute form, or galloping consumption, rapid progress may be made in a few weeks, very little tendency to form fibrous tissue being present, and other micro-organisms probably hasten the softening. Chronic P. is characterised by steeper resistance due to the formation of fibrous tissue, and by periods of rest and recovery alternated with fresh irritation; progress may be slow until the cavities become too large, when decline of resistance sets in. The disease is liable to spread to the alimentary canal and the intestines, when it causes ulceration; diarrhoea is then common; or it may spread to the larynx, where the infection may cause great pain; or it may attack the pleura, a usual complication.

Treatment.—Application of mustard or antiphlogistine poultices, radiant heat, and immobilisation of the chest by strapping, are useful with pleural pains. Nemeny's pill and nepochin are useful in case of night sweats, and the latter for the cough, which is also relieved by hydrocyanic acid or opium preparation. Ice may be applied to the chest or given to suck when hæmoptysis is troublesome; in this case complete rest in bed is essential. Purgatives should be avoided, and if diarrhoea is constant, opium should be resorted to. A generous diet with tonics, maltine, glycerine, and cod-liver oil should be the rule. Removal from unhygienic surroundings is imperative. Overwork should be avoided, and fresh air and sunshine appear to be of the greatest effect. Living and sleeping in the open air, judicious exercise and bright surroundings, or removal to drier climates, have proved of enormous benefit. There is much difference of opinion as to the most suitable climate; dryness and sunshine appear to be most efficacious, but warmth is not necessary. Dampness is not necessarily harmful, but much evidently depends on the climate of use. Residence and the stage of the disease. Pure air and equable temp. are essential, and sea voyages are of great benefit. It is generally considered that early stages can be arrested; the disease is not incurable in such cases, but recovery is slow, and premature return to ordinary habits and work is dangerous. Good results are obtained by collapse of the lung. The three methods used are (1) injection of air into the pleural cavity (*pneumothorax*) or into the abdomen (*pneumoperitoneum*); (2) immobilisation of the diaphragm by crushing the phrenic nerve in the neck (*phrenic avulsion*); (3) removal of parts of the ribs (*thoracoplasty*). Injections of colloidal gold (sanoerysin) are of doubtful value, owing to the risk of gold poisoning. See also **TUBERCULOSIS**. See J. Maxwell, *Introduction to Diseases of the Chest* (3rd ed.), 1918, and *The Care of Tuberculosis in the Home* (2nd ed.), 1918.

Phylacteries, called by the Jews *tephillin*, or *tephillin* (*Talmud*), small cubical leather cases, two in number, one of which is worn on the forehead, the other on the inside of the left arm above the elbow. Each contains a strip of parchment or vellum inscribed with certain texts, viz. Exod. xiii. 1-10 and 11-16; Deut. vi. 4-9 and xi. 13-21. The practice of wearing



PHYLACTERY

P., based on Exod. xiii. 9 and 16, and Deut. vi. 8-9 and xi. 18, began in ancient times (see Song of Sol. viii. 6, and Prov. iii. 3 and vi. 21), and is still continued by strict Jews at the weekday prayers.

Phyllite, fissile clay slate in which the lustre of the finely disseminated mica is very prominent.

Phylloxera, genus of Aphides or plant-lice. *P. vastatrix* is a native of N. America, and the most dreaded insect pest of the grape vines. It appeared in Europe, along with imported vines, between 1858 and 1863. The life cycle of the insect is complex, and it is in the parthenogenetic stage of reproduction that it is excessively prolific. The female, after pairing with a male, lays only one egg, and this may hatch in autumn or survive till the following spring, and then hatch into a wingless larval form, which after a moult lays great numbers of eggs. These in hatching give rise to galls either on the leaves or in the roots, which seriously interfere with the functions of the plants. In the autumn, after sev. generations of wingless females, winged forms appear and these after finding new plants or a healthy vineyard lay large and small eggs, the larger becoming females and the smaller males. Control measures include the use of resistant varieties of vine, and quarantine regulations in dists. where outbreaks occur; infected vineyards are sometimes flooded when circumstances admit.

Phylogeny, see under MORPHOLOGY.

Phyong-yang, see PING-YANG.

Physalia, see PORTUGUESE MAN-OF-WAR.

Physeter, see CACHALOT.

Physical Chemistry, see under CHEMISTRY.

Physical Geography, see PHYSIOGRAPHY.

Physical Metallurgy, see under METALLURGY.

Physical Society of Edinburgh, Royal, see ROYAL.

Physical Society, of London, incorporated body, founded in 1874, and amalgamated in 1932 with the Optical Society. The object of the society is to promote the advancement and diffusion of a knowledge of physics. Membership is open to all who are interested in physics, whether as students (under twenty-six years of age) or as fellows. There are also four specialist groups within the society, optical, colour, low-temp., and acoustics, membership of which is open to all interested in the subjects with which they deal, irrespective of membership of the society. Evening science meetings, at which papers on physics are read and discussed, are held about once a month in London, and full day meetings outside London about three times a year; these may take the form of a conference or visit to an industrial concern. The specialist groups also arrange similar meetings and conferences. The society's annual exhibition of scientific instruments and apparatus in London is a function of interest to all concerned with development and research in the various branches of physics.

The *Handbook of the Physical Society's Annual Exhibition of Scientific Instruments and Apparatus* is pub. each year. The *Reports on Progress in Physics*, also pub. each year, contain articles on various branches of physics prepared by specialists. These articles are surveys of the present state of knowledge in the subject presented in such a way as to be of interest to the non-specialist; comprehensive bibliographies supply information for the further pursuit of the subject. The society also publishes a monthly jour., the *Proceedings of the Physical Society*, containing original papers in all branches of physics. It is divided into two parts. Section A contains papers on micro-physics, the physics of elementary particles, etc.; Section B contains papers concerned with macroscopic physics, e.g. acoustics, radio, geometrical optics, mechanical properties of matter, etc. Reviews of newly pub. books are also included.

The offices of the society are at 1 Lawther Gardens, Prince Consort Road, London, S.W.7.

Physical Training, method of acquiring and maintaining bodily fitness. The belief that mental power and efficiency in action were related to physical well-being was prevalent among the ancients, but their example was not followed in the succeeding centuries except in so far as physical fitness was developed as part of military prowess. It was not until after the pub. of Rousseau's *Emile* in 1762 that the value of P. T. as part of normal education began to be recognised. This conception was developed by the German pioneers, Johann Guts-Muths (1759-1839) and Friedrich Ludwig Jahn (1778-

1852), while Friedrich Froebel (*q.v.*) influenced physical education by his insistence on the importance of play in the growth of the child. Jahn founded an organisation devoted to gymnastics, physical contests, and team games, called the Turnvereine. It was linked to the political resurgence of Prussia in the same way as the Sokol movement, which began in 1862, was linked to the patriotic aspirations of the Czech people. In Denmark P. T. became part of the normal school curriculum as early as 1814, and in the same year the Royal Central Institute of Gymnastics was opened in Stockholm by Per Henrik Ling (1776-1839). Ling introduced a system of gymnastics, known as Swedish drill, which with the Ger. systems has been the basis of most P. T. since his day (see GYMNASTICS; SWEDISH MOVEMENTS). Various modifications have been introduced, particularly in the direction of relating P. T. more to the natural and rhythmical movements of the human body. From Germany and Scandinavia the cult of P. T. spread to most European countries and to the U.S.A. It was at first linked mainly to military training or to remedial treatment for physical defects. Gradually, however, it came to be included in the normal school curriculum. The Amer. Physical Education Association was founded in 1885, and physical education became more and more popular in the U.S.A. from that date. In England, as a result of the preference for outdoor games, P. T. was not introduced into elementary schools until 1909. The value of P. T. is now undisputed, and it is recognised that the various systems are not mutually exclusive. Any course of P. T. must be directed according to the end in view. For instance, the system advocated by Eugène Sandow is primarily for muscular development, while the system of J. P. Müller is directed towards ensuring normal health and well-being. The value of P. T. lies in this possibility of obtaining controlled results, and combined with considerations of diet (*q.v.*) it forms an essential part of any specialised training whether for military purposes or for sport (see TRAINING).

Physical Units. All measurements in scientific work are referred to the *fundamental* unit of length, mass, and time. The *metre* is the unit of length on the metric system, and is the distance between two lines at 0° C. on a platinum-iridium bar called the International Prototype Metre, kept at the International Bureau of Weights and Measures. The Brit. unit of length is the *foot*, one-third of the standard yard; the distance at 62° F. between the centres of two gold plugs in a standard bronze bar, kept in the Standards Office of the Board of Trade. Other usual or practical units are derived from the metre (*e.g.* the cm., mm., etc.) and the foot (*e.g.* inch, etc.) (see WEIGHTS and MEASURES). The *gram* is the metric unit of mass, and is defined as one thousandth part of the mass of the International Prototype Kilogram of platinum-iridium, kept in Sévres at the International Bureau

of Weights and Measures. The Brit. unit of mass is the *pound avoirdupois*, and is the amount of matter contained in a standard piece of platinum kept in London. Again there are the usual practical units (*q.v.*). The *mean solar second* is the unit of time and it is defined as the eighty-six-thousand-four-hundredth part of the mean solar day. Units are either on the C.G.S. (centimetre, gram, second) or the F.P.S. (foot, pound, second) systems. In addition to the above there are *derived* units. (For actual definitions, see under appropriate word.) *Area*: sq. cm., etc. *Volume*: cubic cm., etc. *Density*: mass per unit volume, *e.g.* gms./c.c., or lb./cubic foot. *Force*: dyne (C.G.S.), poundal (F.P.S.). *Acceleration*: cms./sec./sec. or ft./sec./sec. *Energy*: foot-pounds (F.P.S.) or ergs (C.G.S.). 1 joule = 10⁷ ergs. *Power*: Watt (at the rate of 1 joule/sec.). 1 Horse Power = 33,000 ft.-lb./minute. *Heat*: the calorific (C.G.S.) or the Brit. Thermal Unit (B.Th.U.), i.e. the quantity required to warm 1 lb. of water through 1° F. 1 Thern. = 100,000 B.Th.U. of heat. 1 B.Th.U. of heat = 772 foot-pounds of work. There are two systems in electrical work: (a) *The Electromagnetic System*, based on the definition: unit magnetic pole is such that when placed in air 1 cm. from an equal pole repels it with a force of 1 dyne. (b) *The Electrostatic System*, based on unit electrical charge which when placed 1 cm. from an equal charge in air repels it with a force of 1 dyne. For practical purposes these units are often inconvenient, and there are therefore *Practical Units*, *e.g.*: *Current*, ampere; *quantity*, coulomb; *potential difference*, volt; *resistance*, ohm; *energy*, kilowatt-hour or Board of Trade Unit; *capacity*, Faraday; *inductance*, Henry. *Dimensions* of any physical quantity can be given in terms of the fundamental units. Length (*L*), Mass (*M*), and Time (*T*). The dimensions of velocity are $\frac{\text{distance}}{\text{time}} = \frac{L}{T}$ or LT^{-1} , and of Force = acceleration \times mass = $M \times \frac{LT^{-1}}{T} = MLT^{-2}$.

Physician (Gk. *φυσικός*, natural philosopher), one who having passed certain examinations is qualified to practise medicine as a profession. Only those who are qualified in medicine, surgery and midwifery are allowed to practise as medical practitioners and are registered as such under the Act of 1858. In England a practising doctor who is also engaged in trade, or who uses a remedy the ingredients of which he keeps secret, or in any other way does not comply with the rules of the society, is not recognised by the Royal College of Physicians. In the U.S.A. each state has its own laws with regard to the practice of medicine; in general a P. m. obtains a licence after having passed the examination of the state in which he wishes to practise.

Physicians, Royal College of, see ROYAL COLLEGE OF PHYSICIANS.

Physic Nut, or *Jatropha Curcas*, species of Euphorbiaceae found in sub-tropical

parts of the world, but most common in the E. Indies. The seeds contain an acid oil which has emetic and purgative properties, and when expressed is known as jatropa-oil.

Physics may be defined broadly as the investigation of the properties of matter and energy. The definition is generally restricted to exclude those laws of matter and energy which are influenced by the presence of life (biology), and also those laws which take into consideration the molecular changes in matter (chem.). The two branches, P. and chem., overlap a great deal, it being very difficult to draw the line of demarcation between them. The subject matter of P. is subdivided into HEAT (q.v.), LIGHT (q.v.), SOUND (q.v.), ELECTRICITY (q.v.), MAGNETISM (q.v.), and to these may be added RADIATION (q.v.) and ATOMIC THEORY (q.v., and see also ATOMIC HEAT). On light, see also OPTICS, DIFFRACTION, INTERFEROMETER, LENS, MICROSCOPE AND MICROSCOPY, MIRROR, PERISCOPE, PHOTO-METRY, and VELOCITY. Physical Optics is also dealt with under POLARIZATION, ABSORPTION, DISPERSION, REFLECTION, REFRACTION, ERRORS OF. On energy and gravitation see also DENSITY, GRAVITATION, ENERGY, KINEMATICS, PERTURBATION MOTION; also on special aspects of this subject see HYDROMETER, DYNAMOMETER. Reference may also be made to the numerous sub-heads in the article ELECTRICITY AND MAGNETISM and the numerous articles on related topics. See also PHYSICAL UNITS.

While some branches of the subject were successfully studied in remote times and during the Middle Ages, the astonishing progress of modern times can be said to have begun about the time of Galileo (1564-1642) and Newton (1642-1727). In part, at least, this was due to a better appreciation of experimental method; the method, that is, whereby existing theory is allowed to suggest certain questions whose answer, when found by suitable experiments, is made the basis of further theory and further experimentation. Galileo's work on mechanics was carried forward by Newton, whose genius enabled him to state certain generalisations which, until recently, appeared to epitomise the fundamentals of the whole subject, leaving to later generations little to be done except the working out of their consequences in particular cases. Newton also made important contributions to optics. He was, however, unable to accept the wave theory of light put forward by his contemporary Huygens (1629-95), as he could not reconcile it with the rectilinear propagation of light, and the weight of Newton's opinion doubtless retarded the further development of the theory. Nevertheless evidence that light could be diffracted and could undergo interference continued to accumulate until by the end of the nineteenth century the wave theory appeared unassailable.

Knowledge regarding electricity and magnetism (which appeared to be isolated branches of physics) developed steadily

during the same period, and a great advance was possible when near the end of the eighteenth century the invention of voltaic cells made it possible to generate steady currents instead of the minute charges which were all that could previously be obtained by friction. The work of Faraday (1791-1867) and others showed that magnetism and electricity were related, that currents were surrounded by magnetic fields, and that changing magnetic fields could generate currents. This led to modern methods of generating and using electricity. Moreover Faraday's view that the energy of an electric charge is associated with a state of strain in the surrounding medium (the ether) was developed by Maxwell (1831-1879) into the electromagnetic theory of light, a theory that not only linked the branches of light, electricity, and magnetism, but also pointed the way for the generation and use of wireless waves.

During the nineteenth century a mechanical theory of the nature of heat was accepted. It was established, largely as a result of the researches of Joule (1818-1889), that heat in a material was merely the kinetic energy of the particles (atoms and molecules) of which it was composed, and Joule was able to show that whenever heat was produced an equivalent amount of energy of another kind disappeared. Gradually there emerged the idea of the conservation of energy, i.e. that there is, in any system isolated from all other bodies, an amount of energy that, although it may change from one form to another, yet always remains constant in amount. The law of the conservation of energy soon became a fundamental part of physics, and the kinetic theory, when applied to gases, led to simple results and explained the nature of their changes when pressure and temp. are altered.

By the end of the nineteenth century P. appeared as a unified whole, and, on a superficial view at least, physical theories seemed capable of explaining most natural phenomena. It appeared almost as though the main outlines of the subject had been filled in, and that only details remained to be added. Such a view, however, proved entirely illusory, and in the upshot neither the concepts of atoms and the all-pervading ether as then understood nor the laws of mechanics proved satisfactory. According to classical theories the earth moved through a stationary ether, and it was possible by refined experiments to measure its speed relative to the ether. The Michelson-Morley experiment (q.v.), although sufficiently sensitive, revealed no trace of such movement, and led in 1905 to Einstein's theory of relativity. Among other consequences of this theory Newton's laws of motion, although highly satisfactory approximations in most circumstances, are shown not to be fundamental, but to be merely instances of more general laws. Moreover the theory shows that the law of conservation of energy requires modification in that mass must also be regarded as energy; if mass disappears energy must be released in other forms and in enormous

amounts. The second big change of view results from the discovery by J. J. Thomson (1850-1940) of the electron, whose mass was shown to be only a small fraction of that of the lightest atom; this discovery not only demonstrated that the atoms are not the ultimate particles of which matter is composed, but led also to the electrical theory of the atoms themselves. Further it opened the way for the practical use of the electrons in such applications as radio and television, in photo-electricity and X-rays. A third and no less fundamental change was due to the quantum theory (*q.v.*). Pioneered first by Planck (1858-1947), in an attempt to explain certain laws of radiation, this theory has proved to be the key to the understanding of all atomic phenomena. It has revealed not only that light and radiation partake of the properties of both particles and wave motion, but that matter itself has a similar dual nature.

See G. Joos, *Theoretical Physics*, 1934; K. W. Darrow, *Renaissance of Physics*, 1937; P. W. Bridgman, *Logic of Modern Physics*, 1938; C. Caldwell, *Crisis in Physics*, 1939; L. de Broglie, *Matter and Light: the New Physics*, 1939; W. Wilson, *Theoretical Physics* 3 vols., 1940; O. Lühr, *Physica Teilchen*, 1949. See also Sir R. T. Glazebrook, *Dictionary of Applied Physics*, 1922-23.

Physics, Institute of. The objects of the institute are the elevation of the profession of physicist and the advancement and diffusion of a knowledge of physics and its applications in industry. It awards the diplomas F.Inst.P., A.Inst.P., and Grad.Inst.P., has eight branches at home and overseas, and the following specialist subject groups: electronics group; electron microscopy group; industrial radiology group; industrial spectroscopy group; stress analysis group; X-ray analysis group; and an education group.

Meetings and conferences on applied physics are held frequently. The institute awards certificates in laboratory arts and, jointly with the Ministry of Education, national certificates in applied physics. It publishes two scientific journals, each monthly, viz. the *Journal of Scientific Instruments* and the *British Journal of Applied Physics*, and also the *Physics in Industry* series of monographs describing recent advances in certain branches of applied physics. It maintains an appointments register, a panel of consulting physicists, and a benevolent fund.

Physiocratic School, name given to a group of Fr. economists and philosophers of the eighteenth century. Their name was at first 'économistes', but the name 'physiocrates' (Gk. *physis*, nature, and *kratos*, to rule) was given to them by P. S. Dupont de Nemours, one of their number. Their main doctrine was the superiority of nature to all man's work and the excellence of her eternal and immutable laws; thus they held that all commerce was sterile, and the only fruitful labour was agriculture. The money necessary to carry on the affairs of the community they proposed to raise by a single land

tax, whilst their ideal of gov. was a despotism in which the ruler himself obeyed the laws and principles of nature. Their head was François Quesnay, and their chief practical exponent was Turgot, whilst De Gournay and Morellet were also amongst their number. The physiocrats, whose principles were largely drawn from R. Condillon, never had a large following, as their tenets did not attract the multitude. They were, however, sincere, and Turgot used his power in attempting to liberate the industry of France and better the condition of labour. See H. Higgs, *The Physiocrats*, 1897.

Physiognomy, external appearance of the body and particularly the face, its features and expression, from which we are accustomed to draw conclusions as to character. Many attempts have been made to place it on a scientific basis and to render it useful as an art, and with some very slight success in anthropology and criminology. Della Porta (*Humana physiognomonica*, 1586), Campanella, Cardan, and Lavater (*Fragmente*, 1775-73) gave great attention to the subject. Darwin's *Expressions of the Emotions in Man and Animals* (1873), and Monteggia's *Physiognomy and Expression* (1890) were the first works of any scientific value. Piderit, in *Mimik und Physiognomik*, 1886, pays special attention to muscular expression. Physiognomic indications of pathological conditions are of course valuable. Phrenology (*q.v.*) attempts to deduce character from 'bumps' on the skull.

Physiography, or Physical Geography, description of nature, as originated by Huxley and defined by H. R. Mill, describes the substance, form, arrangement, and changes of all the real things of nature in their relations to each other, giving prominence to comprehensive principles rather than to isolated facts. It aims at a general appreciation of the earth and universe in every aspect as shown in everyday phenomena, with the aid of the sciences of astronomy, geology, biology, physics, chem., geography, and meteorology. It cannot strictly be termed a science, being rather a collection from other sciences of those facts which relate to the earth, especially as it exists at the present day. See T. H. Huxley, *Physiography. An Introduction to the Study of Nature*, 1878.

Physiologus, see LESTARIAN.

Physiology. For a sketch of the history, development, and scope of this branch of the science of biology, which is concerned with the functioning of the parts and the behaviour of living beings, see BIOLOGY. For special branches see LONGEVITY, REPRODUCTION, ANIMALS, DEATH, DIGESTION, BLOOD, BILE, CIRCULATION OF THE BLOOD, RESPIRATION, etc.; and for Vegetable Physiology see PLANTS. See Sir M. Foster, *History of Physiology*, 1901; A. Hill, *Pioneer in Physiology*, 1908; W. D. Halliburton, *Physiology*, 1923; S. Wright, *Applied Physiology*, 1940.

Physiotherapy, healing by means of physical agents. The methods employed in P. include not only massage (*q.v.*) but

also arotherapies, balneology, electrotherapy, heliotherapy, and treatment by ultra-violet and infra-red light, which are dealt with separately under these headings. A very important section of P. consists of the rehabilitation of organs whose functioning has been impaired by accident (e.g. war injuries), or by disease (e.g. poliomyelitis, 'infantile paralysis') (see OCCUPATIONAL THERAPY). The training of a physiotherapist commences with the study of anatomy, physiology, and pathology, and is followed by clinical instruction in special schools attached to hospitals. The Chartered Society of Physiotherapy is at Tavistock House (North), Tavistock Square, London, W.C.1.

Physostigma, or **Physostigma**, see CALABAR BEAN.

Physotomy. see BONY FISHES.

Pi, Gk. letter π , used as a symbol to denote the ratio of the circumference of a circle to its diameter: 3.14159.

Placenza, city of N. Italy, in the prov. of the same name, on the r. b. of the Po, 2 m. below the confluence of the Trebbia with that riv., and 36 m. W.N.W. of the city of Pavia. It contains numerous palaces, and is a bishop's see. The cathedral, in the anct. Lombard style, founded in the eleventh century, is famous for the richly curious and grotesque character of its internal decorations. The church of Sant' Antonio, the original cathedral of P., was founded in A.D. 324, but has been sev. times rebuilt. Among the other prin. buildings are the Palazzo Farnese, founded in 1538; also the Palazzo del Comune and the Collegio del Mercanti, both fine monuments of art. Manufs. of silks, flour, brass, and iron goods are carried on.

P., called by the Romans, *Placentia*, on account of its pleasing situation, is first mentioned in 219 B.C., when a Rom. colony was settled there. Twenty years later it was sacked and burned by the Gauls. Here in 1746 the combined forces of France and Spain were defeated by the Austrians. In 1796, and again in 1800, it fell into the hands of the Fr., who evacuated it in 1814. In the Second World War the church of S. Agostino was hit, the fresco by Lombardi being badly damaged. Other churches, too, were seriously damaged, including Carmine Vecchio and the church of the Cappuccini. The Palazzo Malvicini-Fontana was hit in the *cortile*. The cathedral was unharmed. Pop. 73,300.

Pia Mater, see BRAIN.

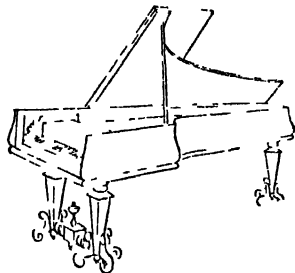
Piankhi (d. 714 B.C.), Ethiopian king of Nubia. The expedition which led to his conquest of Egypt is described on a granite stele, now in Cairo. P. is also the name of sev. other kings of the same race and ter.

Pianoforte, keyboard instrument commonly said to have been invented by Cristofori in the early eighteenth century, which differed from its predecessors in that its strings were hit by hammers, making possible pronounced gradations of tone, hence the derivation of its name from an early description, *col piano e forte*.

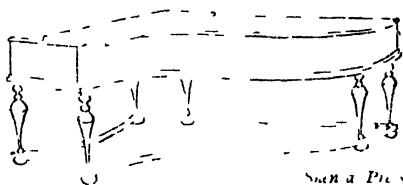
Though plucked string tone can be traced back to the lyre of the anct. Gks. and to still more remote E. sources, only those instruments with a keyboard need be taken into account as direct forerunners of the modern P. Ignoring the now obsolete hurdy-gurdy, the most familiar are the clavichord, virginal, spinet, and harpsichord, all of them possessing certain common, as well as some distinguishing, features. On the sensitive clavichord, dating from the early fifteenth century, the stretched strings were touched by tiny tangents which remained in contact with them as long as the fingers remained on the keys. A slight oscillation of the finger could produce a suggestion of vibrato, and very small tonal gradations were also possible. In shape it resembled a miniature grand piano, without legs, and it was Bach's favourite keyboard instrument. The virginal and spinet both appeared in the early sixteenth century, and the gentle but slightly more metallic tone of each was produced by plectra, which on the depression of the keys, plucked the stretched strings. Because of the plectra, the spinet's name may have been derived from the It. *spina* (thorn), though possibly it was called after the Venetian instrument-maker, Spinetti. The virginal, belonging to England, may have been so named because it was the favourite instrument of Elizabeth, the virgin queen, or because it was popular amongst young ladies, or because it was often used to accompany the hymn *Angelus ad Virginem*. Both were small portable instruments, though of the two the spinet more often had its own legs. More robust in tone was the larger harpsichord, frequently shaped like a small grand piano with legs, which also appeared in the sixteenth century. Again the strings were plucked with small plectra or quills, but the harpsichord had two keyboards, one controlling hard and the other soft quills to produce two grades of tone, which could not be varied by pressure from the player's fingers. In time certain stops were added, bringing other quills into action for tonal effects.

However, Bartolommeo di Francesco Cristofori (1655-1731), a famous It. harpsichord-maker in the service of Prince Ferdinand and his father, the grand duke of Tuscany, Cosimo III., after refining many instruments of the older type, eventually created one with a single keyboard capable of a wide range of tone produced not by mechanical means such as stops, but by the player's fingers; the more swiftly the key was depressed, the louder the tone, and vice versa. This he achieved by substituting hammers for plectra (hence the Ger. name *Hammerklavier*), possibly suggested to him by the old dukimer, on which the player held a hammer in each hand, and though the harpsichord with its plucked tone survived alongside the P. throughout the eighteenth century, the infinitely greater and more natural eloquence in tone of the new instrument came to be recognised by all the romantic composers from Beethoven onwards. By 1711 Cristofori had

completed a P. with a hammer, hopper, and damper, and an improved model of 1726 also included a check to prevent the hammer rebounding. Within a few years of Cristofori's new invention, a Frenchman named Marius and a Ger., Christoph Gottlieb Schroeter, were at work on similar productions, but as Marius produced his at least five years after Cristofori and Schroeter not until after 1717, the It.'s reputation is not seriously endangered by claims on their behalf.



CRISTOFORI'S PIANO, 1726



SILBERMANN'S PORT. PIANO, 1746

After his death, however, the great improvements that followed in details of the action, tone quality, and quantity, and extension of the compass, came more from Germany, England, and later France and America, than from Italy. In Germany Silbermann's later pianos elicited J. S. Bach's approval when he visited the court of Frederick the Great in 1717, and Zumppe's smaller square pianos enjoyed enormous popularity, not least in England. This latter model is thought to have been invented by the organ-builder C. E. Frederici of Gera, some time in the early eighteenth century; it must not be confused with the upright 'cottage' piano (with strings ranged vertically instead of horizontally as formerly in the upright clavichord, known as a clavichtherium) which appeared a century later. In England John Dibdin was the first to perform publicly on the P. in 1767, and thanks to the devotion of such manufacturers as Stodart and the Broadwood family, this company temporarily took the lead. In 1783 John Broadwood patented loud and soft pedals, and in 1808 James Broadwood introduced metal bracing to reinforce the older wooden frames as the thickness of the strings and their tension was increased. Stodart's firm, however, produced the first complete metal frame in 1820. Other firms notably concerned in the instrument's evolution include those of Sebastian Erard (1752-1831) and Ignaz Pleyel (1757-1831) of Paris, and Steinway of New York, whose fine, overstrung metal frame instruments, complete with third (middle) pedal for sustaining bass notes while the upper harmonics are pedalled normally with the right pedal, enjoy pride of place on the concert platform to-day. The twentieth-century Duplex Coupler

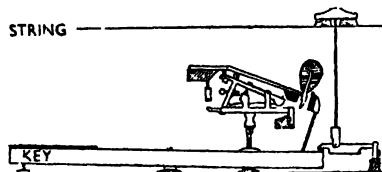
piano (with double keyboard), invented by Emanuel Moor for the facilitation of certain technical difficulties, such as smooth octave playing, has not won universal favour.

A consideration of the normal action to-day shows that the key is simply a lever for raising the hammer, which is lifted to the string by a jointed piece of wood called the hopper, which has supplanted the stiff wire formerly used and which made soft playing impossible. As

the hammer touches the string the hopper is released from the notch which holds it, by contact with a fixed button, and the hammer is allowed to fall, not to its original position, but to a half position, which it maintains so long as the key is pressed down. When the latter is released the hammer falls back ready for the next stroke. To prevent it rebound from the bed into which it falls, the check is fixed on the edge of the key to retain the hammer until the pressure on the key is removed. The finger action in moving the keys not only raises the hammer but also lifts the damper, a small, felt covered piece of wood which ordinarily rests on the string. The depression of the right pedal has the effect of raising all the dampers so that other strings can vibrate in sympathy with those actually sounded. On the modern upright piano the left pedal causes the hammers to move nearer the strings, weakening the force of the impact, and on the modern grand a slight horizontal movement prevents them from hitting all the strings in each case, three strings for top notes, two for low notes, and one only for very low (hence the indication *u.c.* (*una corda*) for the depression of the left pedal and *t.c.* (*tre corda*) for its release). The hammer is covered preferably with felt of a soft, fine texture, which serves to preserve the continuity of the tone. The system of tuning now used is that of equal temperament, in which each octave is divided into twelve equal semitones.

The coming of the P. caused a marked difference in the style of keyboard writing. Its infinitely greater sustaining power brought an end to the Alberti bass (in which chords were split into short reiterated figures) and to the excessive frills and embellishments required to give

an illusion of continuity to a slow melody on any of the older plucked-tone instruments. This can best be appreciated by comparing Beethoven's early with his late P. sonatas, the last of which also shows him so eager to explore the instrument's wider compass. The nineteenth-century romanticists, particularly Chopin, Schumann, and Liszt, took still greater advantage of the right (or sustaining) pedal, revealing also what greater agility was possible on the improved, lighter-touched instruments, while modern Fr. composers, notably Debussy and Ravel, have been particularly concerned to exploit to the



TYPICAL GRAND PIANOFORTE ACTION IN SECTION

full its possibilities of tone colour. Most of the outstanding P. composers have themselves been virtuoso pianists, notably Chopin, Schumann, Liszt, Rachmaninoff, and Medtner. Prominent among contemporary pianists are Arthur Schnabel, Backhaus, Cortot, Gieseking, and Fischer of the older school, and Myra Hess, Clifford Curzon, Claudio Arrau, Rudolf Serkin, and Lipatti of the younger. See C. Sachs, *Das Klavier*, 1923, and *The History of Musical Instruments*, 1940, and Rosamond E. M. Harding, *The Pianoforte*, 1933.

Piarists, religious congregation for the education of poor children, especially orphans. The founder, Joseph Calasancius (1556-1648) was a Sp. priest who opened in Rome in 1597 what is claimed as the first public free school in Europe. To carry on his growing work he organised the P., a name derived from *olerici regulares scholarum piarum*, also known as *Scolopii* (It. *scuole pie*). They exist to-day chiefly in Italy, Spain, and the W. Indies. A similar but independent body known as the Pious Workers of St. Joseph Calasancius, following a modification of the Piarist rule, were founded in Vienna in 1859, and work in Austria and Germany.

Plastre (Lat. *emplastrum*, a plaster, hence anything flattened; It. *pietra*, a coin), old Sp. silver coin, worth about 4s., or a dollar, called a *piece of eight*, being divided into eight silver reals. The It. P. or scudo was worth a little less, while the Turkish coin, also silver, equalled 2d., or 4 cents. To-day it is the name of a Turkish and an Egyptian coin. The Turkish P. is silver, divided into 40 paras and nominally worth about 2½d. It is coined in 1, 2, 5, 10, and 20 P. pieces (all silver), and 100 Ps. go to the 2 sterling. Half P., quarter P., and one-eighth P. pieces are of nickel. By decree of 1916 the monetary unit of

Egypt is the gold Egyptian pound of 100 Ps. Its value in sterling is about £1 0s. 6d. In Eng. money the Egyptian pound is worth 2.466. Coins in circulation include 20, 10, 5, and 2 P. pieces in silver; 1, ½, ¼, ⅛ P. pieces in nickel; ½ and ¼ pieces in bronze. In Cyprus 180 Ps. or 20 shillings go to the pound, which is equivalent to the 2 sterling. Current silver coins are 3, 4½, 9, 18, and 45 P. pieces; bronze and nickel, 1, ½, and ¼ Cyprus Ps.

P.I.A.T. (Projectile Infantry Anti-Tank), see under IMPERIAL CHEMICAL INDUSTRIES.

Piatigorsk, tn. of the R.S.F.S.R. in the N. Caucasus, on the Podkumok, surrounded by five mts. It is a health resort, with sulphur springs. Pop. 62,900.

Piatra, tn. of Moldavia, Rumania, on the Bistritza, at the base of the Carpathians, 60 m. W.S.W. of Jassy. It trades in lumber. Pop. 30,000.

Piahy, state of Brazil, bounded on the N. and N.W. by the Atlantic and the state of Maranhão. The surface is mainly tabolando and is excellent for cattle grazing. The prin. riv. is the Parana-hyba. The chief products are grain, cotton, rice, rubber, dye-woods, tobacco, and sugar, while iron, copper, lead, salt, and silver are found. Cap., Teresina. Area 96,262 sq. m. Pop. 951,300.

Piave, Battle of. The R. P. is in N. Italy; rising in Austria, it flows S. to the Carnatic Alps, thence S.E., entering the gulf of Venice 10 m. above Venice. In the First World War the Austrian offensive during Oct.-Nov. 1917 drove the It. westward on to the line of the P. from the Central Alps to its mouth, and desultory fighting continued until the middle of June 1918, when the Austrians decided to turn the whole of the It. front on the P. by a break-through in the mt. area, supported by a frontal attack from Montello to the sea. The Brit. contingent was stationed about Montello under Gen. Plumer, who was succeeded in March 1918 by Lord Cavan. The Austrians were at first partially successful, but heavy floods broke down their bridges, disorganising communications and commissariat, and a general withdrawal was ordered. In Oct. 1918 Gen. Diaz (q.v.) decided upon offensive action in this area, and the Brit. forces took over more frontage for the operations. The offensive opened on the night of Oct. 26. The Honourable Artillery Company and the Royal Welch Fusiliers attacked the is. of Grave do Papadopoli in the P. on Oct. 25 and 26, and captured it. Attacks were made by the Fr. and Its. in their sectors, all of which were successful. On the 27th Lord Cavan crossed the P., and on the same day the Austrians made an offer of peace. They collapsed completely and were routed disastrously. On Nov. 3 they agreed to Gen. Diaz's terms for an armistice. See ITALIAN FRONT, FIRST WORLD WAR CAMPAIGN ON; ITALY, BRITISH ARMY IN (FIRST WORLD WAR); WORLD WAR, FIRST.

Piazza Armerina, tn. in the prov. of Caltanissetta, Sicily, 16½ m. S.E. of the tn. of Caltanissetta, engaged in woolen

manuf. There is trade in wine and oil. It has a fine cathedral (1517) and a Norman church. Pop. 38,500.

Pibroch (Gaelic *piobaireachd*, pipe-tune), form of bagpipe music, of martial character, consisting of intricate variations on a single theme or *urlar*. See A. Mackay, *Collection of Ancient Piobaireachd, or Highland Pipe Music*, 1839.

Pica, printing type equivalent in the point system to 12 point. See TYPE AND TYPESETTING.

Pica, craving for unnatural food, such as chalk, especially in pregnancy. It is thought to be due to changes in the body's metabolism, or deficiencies such as anemia.

Piocard, Jean (1620-82), Fr. astronomer, b. at La Flèche (Sarthe). He succeeded Gassendi as prof. of astronomy in the Collège Royal de France (1655), and was one of those selected by Colbert to originate the Academy of Sciences (1666). In 1667 P. made his first application of the telescope to the measurement of angles, and soon after discovered a new system of astronomical observation with the pendulum. He measured the arc of the meridian of Paris between Amiens and Malvoisine (1669), which he described in *Mésure de la terre* (1671), and recorded his observations from 1666 to 1682 in *Histoire céleste* (pub. 1741).

Picardy, former prov. of France, having for its cap. Amiens. This region is occupied now by the depts. of Somme and parts of Pas-de-Calais, Oise, and Aisne.

Picardy, Battle of (1918), see FRANCE AND FLANDERS, FIRST WORLD WAR CAMPAIGNS IN (1918), *Battle of Picardy*.

Picaresque Novel, or *novela picaresca*, name of popular origin given to a type of novel which describes the adventures of a *pícaro*. This Sp. word, meaning 'rogue,' has been naturalised into Eng. as 'picaresque,' and first appears in the writings of Capt. John Smith (1579-1631). The *vogue* for novels descriptive of low life and centring on a rascally hero began in Spain with the pub. in 1551 of Hurtado's *Vida de Lazarillo de Tormes*. The subject of this book is the autobiography of a rascal who becomes successively the servant of a blind beggar, of a priest, of a miserly *hidalgo*, etc. It was enormously successful, and Hurtado's example was followed by Mateo Alemán, who wrote *Atalaya de la vida humana*, a title which was changed to *El pícaro Guzmán de Alfarache* by the public with whom it was so popular. A sequel was pub. at Brussels in 1604, while in 1618 appeared another masterpiece of this genre, *Relaciones de la vida y aventuras del Escudero Marcos de Obregon*, by Vicente Espinel. In Sp. these romances of roguery were called *Gusto Picaresco*, meaning the Picaresque School. The *vogue* of the P. N. lasted for over fifty years, but declined towards the middle of the seventeenth century. The Sp. P. N. had a direct influence on the Fr. writer Le Sage, who in his *Le Diable boiteux* (1707) imitated Quevedo's *El Diabolo cojuelo* (1641); and in his still more celebrated *Gil Blas* (1715) borrowed largely from Espinel's *Marcos de Obregon*,

from which indeed he took his prologue, numerous incidents and features, and even the character of Sangrado (Sagrado in Espinel).

In England there existed a sixteenth-century trans. of Hurtado's *Lazarillo de Tormes*, which went through sev. eds., and in 1591 Nash's *Unfortunate Traveller* introduced the P. N. as a native of Eng. literature. In the eighteenth century low life and the manners of rogues were the very stuff of the Eng. novel in the hands of Defoe (*Moll Flanders*, *Colonel Jack*), Fielding (*Jonathan Wild*), and especially Smollett. J. B. Priestley's *The Good Companions* (1929) is a twentieth-century example of the Picaresque style. The old P. N., apart from its literary interest, has a sociological value as a picture of the life and customs of all classes of society. See R. Sallillas, *El Individente español*, 1896, and Harny (*Antropología picaresca*), 1898; Fonger De Hann, *An Outline of the History of the Novela Picaresca in Spain*, 1903; and J. F. Kelly, *A New History of Spanish Literature*, 1926.

Picariæ, picarian birds, an order of Carinate, comprising sev. sub-orders, most of which are inhab. of the tropics. They are the guacharos (*steatornithes*), the Madagascar rollers (*leptomastix*), the humming-birds (*trochilii*), the frog-mouths (*podargi*), the colies (*colii*), the hornbills (*bucerotes*), and the mottos-mottos (*motacillæ*). All these sub-orders have the same characteristics, and contain, as a rule, but few species, which represent the various sub-orders in the tropics of both the Old and New World. All the picarians differ from the passerine birds in the arrangement of the tendons of the foot, the *flexor perforans digitorum* being connected with the hallux. Nearly all picarian birds possess one common osteological character, a double notch in the hinder margin of the sternum. As a rule they lay white or at least uniform pale-coloured eggs, which are always hidden from sight in the hole of a tree, or under the shelter of a building or rock.

Picathartes, genus of Picathartine which is a sub-family of the Struthionidae (starlings) and embraces two closely allied species. *P. gymnocephalus* or Guinea bare-headed rock-fowl, and *P. oreus*, or Cameroon bare-headed rock-fowl. It was not until 1938 that the true relationship of the two birds was recognised, for previously the genus *P.* had been placed by systematists in the Corvidæ and the birds were erroneously referred in literature as bald-headed crows, as has been shown by Dr. P. R. Lowe. The two species are remarkable in appearance, both having the entire head and nape bare of feathers. In *P. gymnocephalus* the crown and skin on the fore part of the face are bright yellow, with the hinder part black; in *P. oreus* the pattern is reversed, the fore-crown lichen blue, the hind-crown carmine red. The skin of the hind-neck is bright yellow in the first, carmine in the second and very untidy feathered in each case. The general colour of the plumage in both is grey above and white below. The bill is long and fairly straight and powerful, and decidedly crow-like, and the

wings are short and rounded. The legs are strikingly developed and the feet are furnished with strong decurved claws suitable for scratching in the ground and for the bird's characteristic long, springing hops. P. is about the size of a crow. It feeds on insects, snails, crabs, frogs, and beetles, and builds remarkable mud-nests which it plasters on rocks. Its very restricted W. African distribution and its habitat among the rocks in forested country at high elevations explain why so few Europeans have ever seen it. Mr. Cecil Webb, curator-collector to the Zoological Society of London, in Sept. 1948, brought back from the Cameroons a specimen of *P. oreas*, the first instance of P. to be seen alive in captivity. See D. A. Bannerman, *The Birds of Tropical West Africa*, vol. vi., 1948.

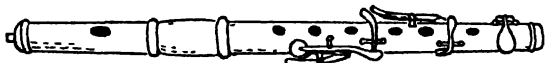
Kipter) of 51,775 ft. and in 1932, from Zürich, 55,577 ft. In 1947 he designed a 10-ton diving bell or 'bathyscaphe' for deep-sea exploration on similar principles, but gave up his attempt in the Gulf of Guinea in 1948. He pub. *Between Earth and Sky* (trans. by C. Apehr, 1949).

Piccolo (It., abbreviation for *flauto piccolo*, meaning little flute). The small octave flute, more usually called *ottavino* in It., similar in shape and technique to the ordinary flute, but smaller in size and standing an octave higher in pitch. It transposes up an octave, its music being written an octave below the actual sound.

Piccolomini, Aeneas (Enea) Sylvius, see PIUS (popes), *Pius II.*

Piccolomini, Francesco Tedeschini, see PRUS (popes), *Pius III.*

Pic du Midi, see MIDI, PIC DU.



PICCOLO

Picasso, Pablo Ruiz (b. 1881), Sp. painter, b. at Malaga. His father was a drawing-master surnamed Ruiz, whose wife's maiden name, P., was assumed by their son. He began to paint very early (at La Ceruna) and fraternised with the artists of Barcelona Academy. He first arrived in Paris in 1900, and took up permanent residence there in 1903. Until about 1905 his work was influenced by the traditions of Degas and Toulouse-Lautrec; he became known as a painter of portrait studies in delicate neutral tints. This was followed by the 'rose period' in which he fell under the influence of Van Gogh and Cézanne. Some time in 1908-9 P. and a fellow artist Georges Braque invented Cubism. This formula has had great influence on the development of painting, and P. himself adhered to it rigidly until 1914. After the First World War he reverted to more classical painting, and designed the *décor* of a number of ballets, but shortly before and after the Second World War his painting became extremely violent and unconventional, causing considerable criticism. The most notable example of this phase is P.'s 'Guernica', painted during the Sp. civil war. In 1945 he turned to naturalism, using neutral colours and simple designs, and a year later he began designing pottery. His paintings are in leading European galleries and at the Museum of Modern Art, New York; he is also represented in many private collections. See A. H. Barr, *Picasso: Fifty Years of his Art*, 1947; D. Sutton, *Picasso: Blue and Pink Periods*, 1949; J. Sabartes, *Picasso: an Intimate Portrait*, 1949.

Piccard, Auguste (b. 1884), Swiss physicist, b. at Lutry. Prof. of physics at the Confederate Technical High School in 1910, and in 1922 at Brussels. He gained fame through his stratosphere flights with a free balloon and air-tight gondola. In 1931, from Augsburg, he reached a height (with his assistant

Picenum, former div. of Italy, lying along the Adriatic coast, and bounded on the W. by the Sabine lands and Umbria. The people of the country became more or less subject to the Romans, and remained so until 90 B.C. In the eighth century A.D. Pepin handed it to the pope.

Pichileago, see CHILMYDOPORTS.

Pichincha: 1. Volcano of the W. Andes in Ecuador, 8 m. N.W. of Quito. It has sev. peaks, the highest being 15,918 ft., while its crater is extremely deep. It has not been in eruption since 1660. Its slopes were the scene of a battle in 1822 when Bolívar triumphed over the Spaniards. 2. Prov. in S.W. Ecuador, subject to earthquakes, though possessing much fertile land. Quito is the cap. Pop. 303,500.

Pickering, mrkt. tn. in the N. Riding of Yorkshire, England, 25 m. N.E. of York. It is an old tn., having a church dating from the fourteenth century and a castle in which Richard II. was imprisoned. There is trade in agric. produce, and agric. instruments are made. Pop. 4300. See G. Home, *The Evolution of an English Town* (1905).

Picket, military term, meaning (1) detachment of regimental details or military police who patrol a tn. to enforce the keeping of bounds, or who remain in barracks for the purpose of guarding against fire or who constitute an unarmed guard on stables, wagon lines, etc. (2) Outmost troops of an outpost line who are not expected to offer serious resistance to the enemy so much as to give warning of his approach. In the eighteenth century when two opposing forces in the field were in loose contact P.s. were used to mark the limit of ground occupied by each side and would be posted in the open in full view of the enemy P. line without either side attempting to molest the other. The word has been borrowed for the vocabulary of industrial dispute (see PICKETING).

Picketing, briefly the prevention of 'blacklegging' in strikes, by stationary persons outside the entrances to the factories or workshops concerned. Under the old Conspiracy and Protection of Property Act, 1875, P. was illegal in so far as compulsion was used by the pickets; but in 1906 an amending Act excluded 'peaceful' P. from the operation of the old Act. Again, the Trades Disputes Act, 1927, passed after the general strike of 1926, provided that P. was illegal if committed in respect of a strike which had been declared unlawful, as was the general strike, by virtue of a decision given in the chancery div. The Trades Union Congress pressed frequently for the repeal of the Act of 1927, and on coming to power in 1945 the Labour Gov. repealed it in full.

Pickford, Mary (stage name of Gladys Mary Smith) (b. 1893), film actress, b. at Toronto. She first appeared on the stage in 1898 as the child Cissy Denver in *The Silver King*. In 1912 she made her first appearance as a cinema actress—for the Biograph Company, under David W. Griffith, in *The Violin-maker of Cremona*. Others of her films were *Stella Maris*, *Rebecca of Sunnybrook Farm*, *Madame Butterfly*, *Daddy Long-legs*, *Dorothy Vernon of Haddon Hall*, and *Little Lord Fauntleroy*; but her appearances in sound films were less successful. She organised the United Artists Corporation with Charles Chaplin, Douglas Fairbanks, and D. W. Griffiths in 1919, and later became head of her own film company. She married three times, Douglas Fairbanks being her second husband, whom she divorced in 1935. She pub. *Why not try God?* (1934) and *My Rendezvous with Life* (1935).

Pickling (metallurgy), the term 'acid-pickling' denotes the removal of scale, oxide, or rust from metals so as to restore their chemically clean surfaces. These various processes may be applied to stock, to work at intermediate stages of fabrication, or to finished components. Stock is available as sheet, rod, bar, tubing, etc., the surfaces of which become oxidised during manuf., either by hot rolling or drawing operations. Scale must be removed before drawing or rolling operations to prevent it from being forced into the metal, with consequent defects. The P. action in some cases is purely chemical dissolution of an oxide or carbonate in the acid of the pickle; in others it may be a mechanical removal of the scale by virtue of action between base metal and acid. Prior to acid P., work must be freed from grease by an alkali or some other solvent; otherwise the oil or grease reduces the effectiveness of the acid P. solution and also causes irregular removal of the scale. After acid P. thorough water washing is necessary to remove traces of acid, otherwise corrosion will occur.

Pickling of Fruit, see PRESERVING.

Pico, one of the Azores is. lava-covered, and having a volcano 7600 ft. high. Wine is the chief product. The chief tns. are Lagens and San Rocco. Area 250 sq. m. **Pico della Mirandola**, Giovanni, Count (1463-94), It. philosopher and writer, b. at Mirandola, the youngest son of Francesco

P., prince of Mirandola. After spending seven years in various univ. cities of Europe, he proposed (1486) a disputation at Rome on 900 subtleties of philosophy. The pope forbade the debate, whereupon P. defended his orthodoxy in an *Apologia*, and in 1493 Alexander VI. absolved him of the charge of heresy. P. also wrote *Heptaplus* (1481), a mystical exposition of the creation. His works also include *Ente et Uno*, an attempt to combine the teachings of Plato and Aristotle, and a treatise against astrology. He led a wandering life, was a generous almsgiver, and a friend of Politian, Ficinus, and Lorenzo de' Medici. See lives by Thomas Moro (Tudor Library ed., 1890), 1510; H. Walter, 1933; and L. Cantier Vignal, 1937; also A. Schull, *Giovanni Pico della Mirandola und die Entdeckung Amerikas*, 1929, and P. Kibre, *The Library of Pico della Mirandola*, 1936.

Picotee, variety of carnation (q.v.) in which the plain coloured petals are edged with a second colour.

Picquet, see PIQUET.

Picric Acid, trinitro-phenol ($C_6H_2(NO_2)_3$, OI), is formed when nitric acid is heated with wool, silk, leather, etc. It is prepared by acting on phenol with nitric and sulphuric acids, and is obtained as a yellow crystalline solid (melting point 122.5°) which is soluble in hot water. P. A. has been, and still is, widely used as a high explosive. Its solution is used as a dye, as are also the potassium and sodium derivatives. These latter compounds, as well as the ammonium derivative, explode violently on percussion. P. A. is of interest as one of the comparatively few organic acids that do not contain the carboxyl group, —COOH. The name is derived from the Gk. πικρός, pikros, bitter, owing to the intensely bitter taste of the acid. See LYXIMITE.

Pierite, olivine rock, usually serpentinised with augite, magnetite, hornblende, etc. Ps. are a subdivision of the ultrabasic igneous rocks, viz. the peridotites.

Pictavium, see POITIERS.

Pictography, or **Picture-writing**, the most primitive stage of true writing (q.v.). A picture or sketch, termed 'pictograph', represents the thing shown. A sketch of a man would indicate 'man'; the pictograph of animal would represent an animal, a circle might represent the sun. Straight narrative can be thus recorded in a sequence of pictographs, but such pictures could not say enough. Therefore the pictographs also became ideographs (thus P. became 'Ideography'): the pictures not only represent the things they show, but also the underlying idea associated with those things; a circle, for instance, might represent the 'day'. P. is found everywhere, among auct. peoples of Egypt, Mesopotamia, Crte, Central America, China, etc., as well as among modern tribes of N. America, Africa, or Asia.

Picton, Sir Thomas (1758-1815), Brit. soldier, b. at Poyston, Pembrokeshire. He entered the army in 1771, became major in 1795, and took an active part in the capture of St. Lucia in the following

year. When Trinidad was taken from the Sp. in 1797 P. was put in charge of the administration as a military dictator, his five years' tenure of office being characterised by arbitrary conduct but undoubted ability in maintaining order. He was criticised for applying harsh Sp. laws in the punishment of natives and he got into trouble with the Privy Council for permitting a kind of Sp. inquisitorial tribunal to be set up for the suppression of *obi* or sorcery. Yet he was a most popular governor, feared yet loved, and he administered Trinidad so successfully that the inhab. presented him with a golden sword when they petitioned against the retrocession of the is. to Spain. He was present at the siege of Flushing (1809), and appointed governor of the tn. He served in the Peninsular war under Wellington, and greatly distinguished himself on many occasions, notably at Badajoz and Vittoria. P. commanded a div. at Quatre Bras, and was shot while leading a charge at Waterloo. See H. W. Robinson, *Memoirs of Sir Thomas Picton*, 1836, and a description of his stormy career in Trinidad in E. L. Joseph's *History of Trinidad*, 1837.

Picton: 1. Tn. of New S. Wales, Australia, 45 m. S.W. of Sydney. Pop. 1500. 2. Cap. of Prince Edward Co., Ontario, Canada, 40 m. S.W. of Kingston. It is important for its foundries, shipyards, and agric. products, especially fruit. Pop. 3400.

Pictor, Fabius, see FABII GENS.

Pictor, one of Lacaille's S. constellations, situated S. of Columba. This constellation was plotted in 1752, and the chief star of the blue or Sirius variety has a magnitude of 3.3. The constellation is notable for containing a star of 8.5 magnitude which has the largest proper motion of any in the heavens except Barnard's star, found in 1916. This is 870" a century, and its parallax of 0.31" indicates a velocity of 82 m. a second.

Pictou, port of entry and cap. of P. Co., Nova Scotia, Canada, 84 m. N.E. of Halifax, in a fertile dist., with extensive coal-mines, steel mills, and building-stone quarries. The P. Academy was opened in 1818. Coal, lumber, dried fish, and canned lobster are exported. P. is Nova Scotia's best N. port for the gulf of Lawrence and overseas trade. Pop. 4500.

Picts, people inhabiting Scotland, part of the N. of Ireland, and perhaps portions of France, notably Poitou, in prehistoric and early historic times. They are described by early Rom. authors as a definite nation. Arrian says that they were *neq. falso nomine Pictos* (not falsely named P.), a statement which has led to the assumption that they received their national appellation because they were either painted or tattooed. Claudian, a court poet, writing c. A.D. 400, alludes to the 'iron-marks' on the body of the dying Pict, but whether the people took its name from the fact that it was painted or not is conjectural. According to some scholars, however, the name is a Lat. trans. of the Celtic-Welsh *pryd*, 'shape', external appearance. The Lat.-speaking Britons

used the term P. to describe the barbarians beyond the N. frontier. By the end of the third century it was the accepted name of the inhab. of central and N. Scotland, and adopted nationally by the Caledonians. Time and again during the Rom. occupation the P. harried Romano-Brit. ter., and to secure the safety of the prov. the Rom. erected at different periods the great frontiers of the Antonine Wall and Hadrian's Wall, across the narrower portions of Scotland. These structures were in some degree instrumental in repressing Pictish invasions so long as they were adequately and consistently manned, but on the departure of Rom. forces from the is. the P. once more invaded Brit. ter., penetrating on this occasion as far as London, and making tremendous havoc. Gildas and Nennius, authors of c. A.D. 570 and c. A.D. 800, and Bede (c. 673-735) are the later authorities on the hist. of the P. The hist. of the P. subsequent to the Rom. withdrawal relates chiefly to constant domestic broils caused mainly by the peculiar circumstances which attended the Pictish law of succession, or, as it has been called, the law of tanistry, in which succession was vested in the eldest and most worthy of the same blood and, therefore, not necessarily according to the principle of primogeniture. Soon after the landing of the Scots in Pictish ter. they became involved in war with the P., and incessant hostilities, covering a period of at least three centuries, concluded only with the union of the two peoples under the sway of Kenneth Macalpine, a Pict on his mother's side. A long list of kings, mythical for the most part, is afforded by the *Pictish Chronicle*, which also notices current events in a very perfunctory manner. After the union of the two peoples there is little doubt that they fused insensibly into one stock, and that the P. form part of the ethnic make-up of the present Scottish people. As late as the twelfth century persons alluded to as P. are to be found in the cartulary of Glasgow cathedral, and at the battle of the Standard in 1138 the vanguard of the Scottish army was composed of P. from Galloway. Indeed Pictish seems to have been spoken in Galloway as late as the beginning of the seventeenth century. Very little is known about the ethnic and linguistic affinities of the P. They are considered by some scholars as early Celts, by others (such as Sir John Rhys, Prof. R. A. S. Macalister, Prof. E. MacNeill) as the pre-Celtic aborigines of Scotland. The Caledonians, who gave the Rom. name to the country, were one of the main Pictish tribes. Sev. Oghamic inscriptions, mainly found in N.E. Scotland and in the N. Isles, are written in a variety of Oghams (*g.n.*) known as Pictish Oghams. They have not yet been satisfactorily trans. One famous word given by Bede, *Pean-fahel* or *Bernal*, is said to signify the 'head of the wulf,' alluding, of course, to one of the ramparts which retarded the S. progress of the P. The P. are mentioned in the panegyric of the orator Eumenius on Constantius Augustus in A.D. 297.

Picts' Houses, *see* BROOD.

Picture Restoring, *see* RESTORATION OF PICTURES.

Picture Telegraphy, *see* TELEGRAPHY.

Picture-Writing, *see* PICTOGRAPHY.

Pidgeon, or Pigeon, English (Chinese corruption of the Eng. word 'business'), mixed jargon much in use in the Chinese ports as a means of communication between the natives and European traders. It consists of Eng., with Chinese, Malay, Hindustani, and Portuguese words constructed according to Chinese idioms.

Piece of Eight, *see* EIGHT, PIECE OF.

Piecework, system of payment of wages by results as opposed to payment by time-earnings. For many trades the latter is, generally speaking, the only form that could be applied, since they are not adapted to measurement of output, nor would they be easily able to carry a general or overhead bonus based on efficiency. The simplest and oldest form of payment by results is individual P.; group P. is an extension of this; gang P. prevails in jobs which need the close co-operation of sev. individuals; overhead P., based frequently on the normal output of the work as a whole, provides that, in whatever proportion it may be exceeded, in the same proportion the aggregate wages of the workers will be increased. To encourage 'P. speed' on work which does not lend itself to measurement by the 'piece' there are various local systems, which include 'guarantee rates' or 'lieu rates,' mostly additions to ordinary time-rates, sometimes the survival of a local custom, or induced by the pressure of exceptional conditions of work. Much more complex in many respects are the bonus schemes which have direct reference to output; for both value of output and sales are liable to fluctuations in the sphere of distribution not under the control of wage-earning producers. Objections to P. systems have been made on the grounds that they foster jealousy and rivalry among workers; that piece-rates undermine standard time-rates, that earnings on P. are variable and precarious, upset family budgets, create inequality of wages between individual and individual, and group and group, and serve to emphasise to the employer differences in capacity or industry; and also that they conduce to undue speeding up, exhaustion of the worker, and to a shorter working life owing to premature decline of physical and mental energy on account of the increased strain. It is sometimes contended that systems of remuneration based on results involve a departure from the principle of collective bargaining. Employers and trade unions, however, deny these objections generally and maintain that in so far as they may be valid the remedy lies not in the abandonment but in the perfecting of the system. *See further under* WAGES. *See* W. Graham, *The Wages of Labour*, 1021.

Piedmont, region of N. Italy, bounded on the N. by Switzerland, E. by Lombardy, S. by Liguria, and W. by France,

and comprising the provs. of Alessandria, Cuneo, Novara, and Turin. It has an area of 9813 sq. m., is watered by the Po, and is shut in by the Pennine, Graian, Cottian, Maritime, and Ligurian Alps. Its soil is fertile, producing olives, vine, wheat, maize, rice, chestnuts, fruit, etc., and coal, lead, copper, silver, and salt are mined. The chief manufs. are silk, cotton, and wine. In anct. times P. formed a part of the Rom. prov. of Gallia Transpadana. In the eleventh century it was incorporated with Savoy. Pop. 3,580,000.

Piedras Negras, tn. of Mexico, on the Rio Grande, opposite Eagle Pass (Texas). It is a port of entry to N.E. Mexico and is 850 m. from Mexico city. In the vicinity are coal, silver, copper, and zinc mines. It is also a cattle-raising centre and cattle and horse markets are held. Pop. 18,900.

Piel (originally Fowdray), is. and harbour of the Furness Peninsula, Lancashire, England. Here Lambert Simnal landed in 1487. The is. is notable for the ruins of P. Castle. Pop. 3.

Pien-liang, *see* KAI-FENG-FU.

Pie-poudre, Court of (*curia pedis pulverizati*), in England, was formerly held at fairs or markets to administer ready justice to buyers and sellers, and has now fallen into disuse. It was so called from O.F. *pied poudre*, 'dusty foot.' It is mentioned in the O.E. law books as the court *pepoudrous*, meaning that justice was administered 'while the dust fell from the feet.' Courts *pepoudrous* were 'incident to every fair and market because that for contracts and injuries done concerning the fair or market there shall be speedy justice done for advancement of trade and traffic.' The necessity for this speediness for certain classes of people was recognised as far back as Bracton in the thirteenth century. The records of these courts are necessarily few, and, as a consequence, 'there is no part of the history of English law more obscure than that connected with the maxim that the Law Merchant (q.v.) is part of the law of the land' (Blackburn). But the Seiden Society discovered the abbot's roll of the fair of St. Ives, 1275-91, containing a series of cases which show how the merchants administered the law merchant in the courts of the fair, and why such cases did not come into the king's court. In most seaport tns. there was a similar court dealing with cases arising out of ships. Thus any ship coming into the port of Ipswich with a dispute about its Bill of Lading might get summary justice at once from the 'pepoudrous' court at Ipswich between tide and tide (Black Book of Admiralty, Rolls Series, II. 23).

Pier, in architecture, support or pillar for an arch, bridge, or beam; also a rectangular narrow projection on a wall to give additional support to a beam or other load. A P. template is a stone cover on a brick P. L. distribute the load over the whole section. A P. is essentially a structural member as distinct from a 'pilaster' (q.v.), which is often merely of decorative value. Also a breakwater or

jetty built out into the sea, serving to form a harbour, a landing-place, or a marine promenade. See also BREAKWATER.

Pierce, or Peirce, Benjamin (1809-80), Amer. mathematician and astronomer. He was educated at Harvard Univ. and studied under Bowditch, author of *The Practical Navigator*. On the death of Bowditch in 1838 P. became the leading Amer. mathematician. The first work that made his name more widely known was his computation of the general perturbations of Uranus and Neptune, and another important astronomical work was his research into the equilibrium of Saturn's ring, in which he showed that a fluid ring was unstable as well as a solid one. His chief mathematical works were *System of Analytical Mechanics*, and *Linear Associative Algebra*.

Pierce, Franklin (1804-69), fourteenth president of the United States, b. at Hillsborough, New Hampshire. He served in the House of Representatives (1829-33) and in the Senate (1837-42). He fought in the Mexican war (1846-47), and was elected President from 1852 to 1857. His objection to the abolition of slavery was the chief cause of his subsequent withdrawal from political life. See lives by N. Hawthorne, 1852, and J. R. Irelan, 1888; also Anna E. Carol, *Review of Pierce's Administration*, 1856, and W. R. Leech, *Calendar of the Papers of Franklin Pierce*, 1917.

Pierres, see under IGNOTUS ROCKS.

Pierlot, Hubert (b. 1883), Belgian statesman, b. at Cugnon. A member of the Catholic party, he was minister of the interior (1934-35), minister of agriculture (1936-38), Prime Minister (1939). In 1940 he assumed also the office of foreign minister, and after the capitulation of King Leopold became head of the Belgian Gov. in exile in London. After Belgium was liberated P. headed a gov. from Sept. 1944 to Feb. 1945.

Piero della Francesca (c. 1416-92), It. painter, b. at Borgo San Sepolcro, Tuscany; also called **Pietro Borghese**. He preferred to be known by the name Francesca, in recognition of his widowed mother's devotion. P. is chiefly remembered as a painter in fresco. He visited Rome, where he painted frescoes in the Vatican for Nicholas V. These were immense works, and were reproduced in the Vatican library. They were, however, in poor condition as early as the sixteenth century, when Raphael was commissioned to replace them with his masterpieces. There is therefore somewhat slender evidence of the merit of his work. Vasari states that P. did work in an Augustinian chapel, but this no longer exists, and his most famous fresco works are those in S. Francesco of Arezzo, slightly damaged during the Second World War, at Borgo San Sepolcro, and the 'Flagellation of Christ' in Urbino Cathedral. Fuller estimates of his powers are founded on the 'Resurrection of Christ,' an oil painting found in an old Augustinian convent at Arezzo. It is in the style of Perugino, although inferior to the work of that painter. Tiraboschi, commenting

on another painting attributed to P., 'Dream of Constantine,' praised it for its effects of light and shade, special knowledge of the play of muscles, and magnificence of drapery. But critics aver that most of these qualities are not to be found in the 'Resurrection of Christ,' although it is commonly agreed that the effects of silhouette and the sumptuous treatment of robes do render the work remarkable, and are of themselves sufficient merit to warrant his work receiving much higher appreciation. The education of Bramante as a painter is generally ascribed to P., whose work, like that of the latter, is regarded as having some affinity to the school of Padua. P. is, moreover, also celebrated for revealing an advanced knowledge of perspective. He lost his sight at the age of sixty, but lived till eighty-six. See lives by G. Ricci, 1910; H. Graber, 1920; A. Venturi, 1922; and R. Longhi, 1927; also A. Stokes, *Art and Science*, 1919.

Piero di Cosimo, see COSIMO.

Pierre de la Ramée, see RAMUS, PETER.

Pierre, Jacques Henri Bernardin de Saint, see BERNARDIN DE SAINT-PIERRE.

Pierre, cap. of S. Dakota, U.S.A., and also of Hughes co., on the Missouri R., and on the Chicago and Northwestern Railroad, 110 m. W. of Huron. Natural gas is found, and the tn. has a large cattle market. There is a gov. Indian industrial school. Pop. 4300.

Pierson (originally **Pearson**), **Henry Hugh, or Heinrich Hugo** (1815-73), Eng. composer, b. at Oxford. He was educated at Harrow and Cambridge, studied music with Attwood and Corle, and interrupted a medical course to continue musical studies at Leipzig, where he met Mendelssohn, Schumann, and others. He became Reid prof. of music at Edinburgh in 1844 in succession to Bishop, but soon resigned and returned to Germany, where he remained, married Caroline Leonhardt, and changed the spelling of his name. He produced a musical setting for Goethe's *Faust* (1854), the operas *Leila* (1848) and *Contarini* (1872), the oratorios *Jerusalem* (1852) and *Hezekiah* (unfinished), and *The Mariners of England*.

Piers Plowman, see LANGLAND, WILLIAM.

Pieter de Hondt (later **Saint Peter Canisius**) (1521-97), Ger. Jesuit theologian, b. at Nijmegen, Holland. He became a Jesuit in 1543 and founded the first house of the Society in Germany, at Cologne. He became the first provincial of the Society in Germany (1556). The re-establishment of Rom. Catholicism in Germany was due largely to his zeal. His catechism, *Summa Doctrinarum*, was authorised in 1566. He was canonised in 1925.

Pietermaritzburg, seat of gov. and cap. of Natal, S. Africa, 56 m. N.W. of Durban; founded by the Boers in 1839, and called after two of their leaders, Piet Retief and Gert Maritz. Retief and Maritz were leaders of the trekkers who crossed the Drakensberg in 1838 into Natal and were murdered, together with their followers, by Dingaan, the Zulu king. Later Andries Pretorius made a vow that if

God gave his men victory they would build a church and set apart one day every year to commemorate it. The sequel was the decisive victory of the battle of Blood R., whence the Church of the Vow, built in old Cape Dutch style and opened for worship in 1840. It was subsequently acquired for the nation and is now a museum for voortrekker relics. A Brit. regiment garrisoned the tn. in 1856, when Natal was made a separate colony by royal charter. The first legislative council of Natal met in P. the next day and thus the tn. became the cap. of Natal. Few buildings of the P. of a century ago are to be seen to-day, and the old Itaalzaal or House of Parliament, built closely on the lines of the Church of the Vow, was demolished and the present city hall built on the site. The city hall was rebuilt and reopened in 1901, the original hall having been destroyed by fire in 1898. The city has broad streets and is built on a sloping plain (altitude 2218 ft.) and is noted for its healthy climate. Pietermaritz and Relief Streets perpetuate the names of the two pioneers; other pioneers are commemorated in the street names of Burger, Boshoff, and Greyling. P. is the seat of an Anglican bishop, and is the home of the univ. of Natal; it has also many schools and colleges. There is an art gallery, library, hospital, and the Natal Museum, the latter being notable for its collection of big game animals and economic insects. P. has a large tanning extract factory capable of processing 40,000 tons of wattle bark annually with an ann. extract production of 12,000 tons. Here also is one of the largest shoe factories in the S. hemisphere. Other industries include bricks and roofing tiles, chocolates, cream, dairy utensils, machines for crushing maize, and biscuits. The botanic gardens were estab. in 1874. Flowers and shrubs from all over the world are gathered in these gardens, which stretch over 100 ac. There are also parks and a natural bird sanctuary. P. is set in a countryside of lakes and streams and waterfalls. In the vicinity are Howick on the Umgeni R., with golf course and tennis courts; the Karkloof Falls and the Umhass Falls, all popular camping places. Pop. 55,400 (including 26,100 Europeans). See L. Trichardt, *Trek across the Drakensberg* (ed. C. Fuller), 1837-38; M. Nathan, *The Voortrekkers*, 1937; H. G. McKeurtan, *Cradle Days of Natal*, 1930; and A. F. Hattersley, *Pietermaritzburg Panorama*, 1938.

Pietersburg, chief tn. and administrative unit of the N. Transvaal, S. Africa, near the source of the R. Sand. Copper, tin, antimony, and corundum are worked in the vicinity, and P. is the centre for large goldfields. Pop. 11,000.

Pietists, name given to the adherents of a movement in the Lutheran Church during the seventeenth century in reaction against what they considered cold dogma devoid of religious feeling and practical piety. Without separating from the Lutheran Church, the P. instituted meetings called 'Collegia Pietatis,' whence their name. Philipp Jakob Spener was

the chief promoter of these meetings, which began about 1670. The movement produced some interesting literature. Pietism was not an isolated movement, but can be connected with similar tendencies in other countries.

Pietra Dura, name applied to the finest kinds of Florentine mosaic work, formed of inlaid materials of the hardest kind, viz. agate, jasper, cornelian, chalcedony, etc., set in marble. The true P. D. work is practically confined to Florence, and dates back as far as the sixteenth century; but inferior kinds are manufactured in Italy, where coloured sea-shells are used as a substitute for the stones.

Pieve Santo Stefano, tn. of Italy, in the prov. of Arezzo, situated on the Tevere R. It has some interesting monumental buildings, including the Collegiate Church, which, after the fighting of 1644, stood untouched and almost alone among the ruins. The tn. was systematically destroyed by the Gers. The church of S. Francesco was badly wrecked but the della Robbia reliefs survived. Pop. 5900.

Piezoelectric Effect, see under QUARTZ CRYSTAL.

Piezometer, instrument for measuring the compressibility of liquids. The simplest form consists of a strong glass cylinder, the top of which is fixed to a metal cap. This cylinder is filled with water. Inside the vessel a long glass bulb terminating in a capillary tube is filled with the liquid to be experimented upon, the end of the capillary tube dipping beneath the surface of some mercury. The volumes of the bulb and the capillary tube are known. Pressure is applied to the surface of the water; this forces the mercury into the capillary tube, thus subjecting the liquid to a pressure which is measured by means of a manometer. By observing the compression, the compressibility per unit of pressure can be calculated. The contraction in this case is not totally due to that of the liquid, but the volume of the glass vessel also contracts, and thus a correction has to be made, which Reynault eliminated by a new form of P.

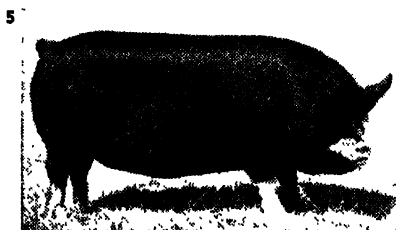
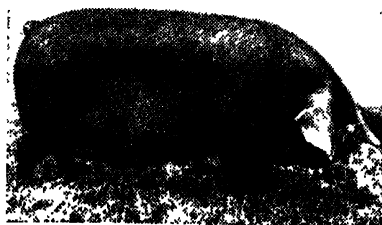
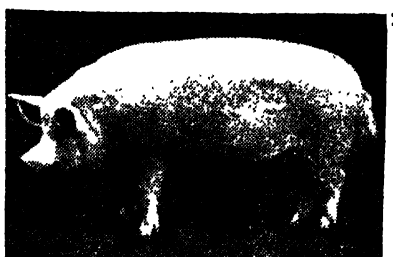
Pig. The wild boar survived in Britain until the eighteenth century. It is from crosses between its tamed representatives and the Neapolitan and Chinese Ps. that the valuable Brit. breeds of domesticated Ps. originated. The domestication of the P. began at a very remote period in China, but it is only in recent years that special attention has been devoted in all parts of the world to the breeding of animals that satisfy the demand for very prolific sows and perfect pork- and bacon-making 'machines.' All the best European and Amer. breeds owe their present quality to the introduction of blood from Brit. stock. Modern Brit. breeds have attained their present conformation and qualities as the result of careful breeding and selection during the past seventy years. The founding of the National Pig Breeders' Association in 1884 and individual breed societies at subsequent dates have done much to determine the value of the pedigree P. trade as a national asset.

With breeding and selection the long snout, narrow head, and agile, hump-backed muscular body of the wild races have given way to a broader, shorter snout, fuller head and neck, long, level, and broad back, full belly and shorter legs.

Breeds—The number of Brit. breeds is few and tending to become fewer. The *Large White*, also referred to as the *Large White Yorkshire*, has a great reputation at home and abroad as a bacon P. The excellence of Dan. bacon owes much to the blood of this breed. The head is moderately long, face slightly dished, snout broad and not turned up much, and wide between the ears; the ears are long, thin, slightly inclined forward, and fringed with fine hair; neck is long, chest wide and deep, back long, level, and wide, belly full with straight underline, hams broad and full to hooks, legs straight and well set, skin fine, white, and smooth, and coat long and silky. The sows are docile and prolific, and on the whole good mothers. Although the number of Ps per litter is usually higher than that of any other Brit. breed, the losses between birth and weaning also tend to be higher. Nevertheless this breed and its crosses provide the best bacon Ps. The *Middle White* was also evolved in Yorkshire, from a cross between the *Large White* and the *Small White*, the latter being now extinct. The *Middle White* is an excellent pork P. attaining killing weight early, with a high percentage of meat to bone, though modern types are good for pork or bacon. For bacon, however, a *Large White* *Middle White* cross is probably better than the pure *Middle White*. The *Large Black* is a breed supposed to have originated in the E. and long popular in Devonshire, Cornwall, Suffolk, and Essex. Although the Breed Society only came into being in 1899, the breed was recognised a pure for many years before. Their dark skin makes them less susceptible to the sun and they are excellent for hot climates. The *Tamworth* originated in Staffordshire and is characterised by its abundant, golden-red hair. It is supreme as a forager, producing a very high proportion of lean meat, and is esteemed for bacon crosses. The sows are less prolific than those of other breeds but rear more of their offspring to weaning. The *Berkshire* was the first Brit. breed to be improved, records going back to 1850. The breed provides a very fine pork P. and is considered valuable for crossing with larger and slower maturing breeds for bacon production. The *Wessex Saddleback*, originating in Dorset, is now esteemed all over the country as a very hardy breed, providing excellent graying Ps which can be killed from early age onward. Outstanding characteristic is the colouring, black head and neck, black body, hind quarters, and hind legs, with a white saddle over shoulders and forelegs and continuous belt of white hair. The *Essex*, or *Essex Saddleback*, resembles the *Wessex Saddleback* with its belt of white encircling the shoulder and forelegs on a black body, neck, and head. The breed is held to be descended from the

old Eng. P. and is esteemed for its hardiness, adaptability to outdoor conditions, and production of good pork Ps and bacon Ps., especially when it is crossed with the *Large White*. The *Gloucestershire Old Spot* is an old breed originating at about the same time and from similar parentage to the *Berkshire*, although the herd book only goes back to 1913. It became noted in the Second World War for its ability to do well on swill alone, and is a hardy, adaptable, and reasonably prolific pig. It is characterised by its white ground colour with a few large black spots. The *Welsh*, although an old breed, has only become widely known since 1918. Its characteristics are said to resemble those of the Dan. *Landrace*. It is a good bacon P. though slow in growing. The *Large White Ulster* is a N. Ireland breed that is now practically extinct, and the *Lincolnshire Curly Coat* has not found much favour beyond its own co. Floppy ears are now considered objectionable and lop-eared strains of breeds are now less frequent. Ps are usually kept with four objects: (a) as a herd to provide gilts (females which have not littered) and sows for breeding, (b) as a herd to provide piglets for others to feed and rear for pork or bacon, (c) as a herd of bought Ps. for fattening as pork or bacon, (d) as a breeding stock to provide piglets for feeding for pork or bacon on the farm where born. The choice of breed or cross-breed will be influenced primarily by the ultimate object, but also by the methods of feeding and housing.

Feeding—Ps can either be fed on waste products such as swill, or on concentrated foods, or on a mixture of both. The ideal is to promote unchecked growth and a steady gain in weight from 1 to 1½ lb as a daily average from birth. As food comprises about 75 per cent of the total cost of production, careful thought should be given to the choice and balance of the rations. Ps may be fed twice but preferably thrice, daily. The policy is to feed well-balanced meals which are eaten up within 20 min., rather than to provide all that the P. will eat at a time. In practice, a balanced meal provides a proper proportion of protein for tissue-building to carbohydrates (starches, fats, and oils) for body heat, energy, and weight gains in body fat. This proportion, known as the nutritive ratio, is 1.4 to 1.5 for young growing Ps, and breeding sows, and 1.6 to 1.8 for fattening Ps. There must also be a proper content of food minerals for bone formation, milk production, etc., vitamins for health protection, and water. Where Ps. are reared out of doors and receive green foods and fish meal, mineral or vitamin deficiencies are unlikely. Where the protein is all vegetable, a supplement of lime and salt is needed. Vitamin deficiency of A and D is possible in Ps. housed indoors and getting little or no green food. Cod liver oil at ½–1 oz daily is the corrective. Given enough minerals and vitamins, the key to balanced rations lies in the protein-carbohydrate or nutritive ratio. The heavier the P., the more



BREEDS OF PIGS

- 1, Middle White Gilt; 2, Large White; 3, Large Black; 4, Tamworth boar; 5, Berkshire Gilt; 6, Wessex Saddleback; 7, Essex Saddleback (*Farmer and Stockbreeder*); 8, Danish Landrace (*Royal Danish Embassy*)

protein needed. At 50 lb. a P. needs 0.3 lb. protein daily, at 75 lb. 0.4 lb., at 100 lb. 0.5 lb., and at 150 lb. or more, 0.6 lb. The chief protein-rich foods are fish meal, meat meal, bean and pea meal, dried blood, dried yeast, soya-bean meal, decorticated ground-nut meal, and separated milk. The chief carbohydrate-rich foods are barley meal, flaked maize, maize meal, maize germ meal, weatings, wholewheat meal, tapioca meal, potatoes, bran, middlings, ground oats, brewers' grains, and sugar-beet pulp. The last five are considered somewhat inferior, owing to high fibre content, and should not bulk too largely in the rations.

The actual composition of a 'feed' will depend first upon the age and purpose of the Ps., and then upon the foods available and their price according to season and supplies. A popular tested ration for a sow is 10 per cent fish meal, 45 per cent barley meal, and 45 per cent weatings. In varying this or any other ration, other foods of similar feeding values should be chosen to replace part or all of one of the prescribed ingredients. Roots and green foods may supplement a reduced meal ration, though their chief contribution is to the health of the Ps. Swill consisting of kitchen waste is a major P. food during wartime and under shortages. Untreated or raw swill must, by law, be steamed or boiled for at least 1 hr.; 3½ lb. swill replaces 1 lb. of P. meal in a ration. It is most suitable for Ps. of 50 lb. or more, and should have cereal meal added to a suitable consistency. Prepared concentrated swill (Tottenham pudding) is offered by certain local authorities. Ps. may be fed (1) dry meal, with water provided separately; (2) dry meal with water poured on to it; (3) meal soaked and fed wet from buckets. Care is needed in (1) and (2) if meal is not to be wasted. The simplest feeding is with balanced rations in cubed form, the higher cost being offset by the labour saved.

Housing.—Ps. are naturally clean animals. Given good housing they will not soil their bedding but usually void in a corner of their shelter or run. Dry, weatherproof quarters, free from damp and draughts, are essential for thrifty growth and good health. Outdoor housing is suitable for all types and ages of Ps., but fattening Ps. are usually housed indoors, where warmth and restricted exercise encourage fattening more quickly. P.-houses should face S., unless flanking a central feeding alley when the pens should run N. and S. Out of doors access to grazing means some economy in feeding, but damage to pastures. Buildings should be movable, and designed to give a dry bed and protection from draughts and sun. A floor area of 9 ft. by 6 ft. is desirable. Sectional wooden huts on runners or wheels or triangular P. arks are suitable for tethered sows with litters and weaner Ps. Feeding troughs are separate. Such buildings can be made into fold units by fencing runs, but need moving frequently. True fold units consisting of house with run and built-in feeder and water trough are made of wood and con-

structed to be moved at intervals of not more than three days. They are suitable for boars, expectant sows, sows and litters, and weaned Ps. up to 100 lb. live weight. Outdoor shelters may be improvised from straw bales, thatched hurdles, and straw-stuffed wire but are temporary expedients at best. **Indoor housing** may consist of one or more sties with runs attached, adapted farm buildings with or without an open or covered yard, or blocks of individual sties with central feeding alleys of the Dan. or Scandinavian type. Sties may be built of wood, pressure-cresoted, brick, or hollow concrete blocks. For sows and litters a sleeping compartment and a run, each 8 ft. square, are the minimum; for fattening Ps. the dimensions should be 12 ft. by 6 ft. Floors must be warm and dry. Wooden floors are warmest but not durable. Concrete floors are suitable if insulated from the cold and damp of the earth. Provision of a farrowing rail is helpful for sows. A built-in feeding trough with a swinging shutter is an advantage. On the farm open or covered yards can be adapted by dividing with straw bales or straw-stuffed wire-netting walls. Loose boxes and disused stables can also be converted. The central feeding or Scandinavian type of P.-house consists of two or more ranges of pens under one roof with central feeding passage and dung passages. Careful design is needed to avoid draughts and faulty ventilation. Floors must be insulated from the earth and outer walls constructed of 'warm' materials. Air-conditioning has been found advantageous. Important measurements are: pens 8 ft. 6 in. by 12 ft., dung passages 3 ft. 6 in., and feeding passage 6 ft.; each pen to hold ten Ps. Detailed plans are contained in Bulletin No. 32 on *Pig-keeping* (Ministry of Agriculture and Fisheries).

Diseases.—Swine fever is contagious and most serious. It must be notified by law to the authorities. Sick Ps., usually young, lose appetite, vomit, shiver, suffer great thirst, and tend to eat filth and bedding instead of food. A purple rash may appear on ears and belly; death occurs most often at fifteen days. It is a virus disease. Non-infected Ps. can be protected by the injection of serum. Best preventives are home-breeding of stock, good control of rats, isolation of sick Ps., and isolation of any bought stock for a month. Foot and mouth disease, another virus infection, may affect Ps. and is notifiable by law. Infected Ps. go off food, have high temps., become lame, slaver at the mouth, and blister inside the mouth and sometimes on the skin. Swine erysipelas is not notifiable. It causes a high temp., loss of appetite, and a dark red or violet rash may appear on chest, back, neck, and thighs in patches. Acute infection causes death in a few days. Mild cases may recover or become chronic. Serum injections usually cure most cases. Ann. vaccination may also be used as a preventive. Mange, a scabby condition of the skin, may be treated by scrubbing with warm, soapy water, and then dressing with a mixture of 5 parts milk of sulphur

and 20 parts cod liver oil twice weekly. Ps. are subject to sev. parasites. The round intestinal worm is common, also the lung worm. A hair-like spiral worm, *Trichina spiralis*, encysts in Ps. and is communicable to man in insufficiently cooked pork, ham, or bacon. Remedies are based on santonin and oil of chenopodium, and worming is usually done at 8-10 weeks. Cleanliness in the sties and frequent change of run, if out of doors, are important preventives. Lice may be eradicated by dressing with linseed or mineral or motor oil.

Economics of Pig-keeping.—Expenditure must be recovered largely from sale of Ps. Straw, foods, etc., come from outside sources. An economical unit comprises thirty sows and their progeny and two boars, manageable by one man and an apprentice or boy. A herd of half in-P. gilts and half younger gilts, with some pedigree animals for future breeding, gives a sound starting stock; the 1949 cost was £750-£800. The minimum housing would be sixteen or seventeen farrowing sties, a feeding house for weaned Ps., and houses for the boars and growing gilts. Initial capital costs are high. A working capital of roughly one-third that of the initial outlay will also be required to carry through the first year. Food comprises 75-78 per cent of production costs, labour 12-15 per cent, leaving 10 per cent to cover sundries. Depreciation of buildings may be charged at 10 per cent per year, while breeding stock depreciates by about 20 per cent in the case of sows and 30 per cent in the case of boars annually.

Home Pig-keeping.—The usual practice is to buy a P. at six weeks after weaning for fattening for bacon or pork. To produce a pork P. of 120 lb. live weight requires 3 cwt. of meal and takes about three months; a bacon pig of 200 lb. live weight requires 6 cwt. of meal and takes about six months. Economies in feeding can be made by using kitchen waste. Apart from the wide range of food products yielded by a P., there is the fertilising value of its manure for the garden.

See Ministry of Agriculture, *Pig-keeping* (Bulletin No. 32); *Home Curing of Bacon and Hams* (Leaflet No. 127), and *Farm Buildings* (Post-war Studies No. 17); R. Morrison, *The Individuality of the Pig*, 1926; G. W. Layley and W. J. Malden, *The Evolution of the British Pig*, 1935; V. C. Fishwick, *Pigs, Their Breeding, Feeding, and Management*, 1939; J. W. Reid, *Pig-keeping*, 1940; J. D. Anthony, *Diseases of the Pig and its Husbandry*, 1940; W. Brett, *Garden and Allotment Pig-keeping*, 1941; H. L. Tinley, *Good Pig-keeping*, 1947; H. R. Davidson, *The Production and Marketing of Pigs*, 1948.

Pigeon, or Dove, any member of the *Columba*, one of the main orders of birds, including the extinct dodo and solitaire and the tooth-billed P. (*Didunculus strigirostris*) of the Samoan Is., the beautiful crested crowned Ps. of New Guinea, and the *Columba* or true Ps. The four Brit. species are the large wood P. or

ring-dove (*Columba palumbus*), which often does serious damage to crops; the stock-dove (*C.enas*); the turtle-dove (*Turtur communis*); and the rock-dove (*Columba livia*), from which many of the domesticated breeds of P. are derived. See PASSENGER PIGEON.

Domestic pigeons exist in great variety, all parts of the body having been developed to give the marked characteristics of the different breeds, from the dainty fantail to the pouters and croppers which can enlarge or distend the crop or pout; from the tiny tumbler to the huge runts. Wide differences occur also in the plumage; in the archangel it has a beautiful lustre; in the jacobin the feathers of the neck and head form a large hood and mane, and between the numerous breeds is a wide range of colouring. The scandaroon has a long curved beak, the owl a very short and stout one; in the carrier, which is not used like the homer for carrying messages, the beak and eye wattles are enormously developed. The P. fancy is now very large, and a great number of shows are held annually. Particularly choice and successful specimens have been sold for over £100, and £20 to £50 is often paid for single birds. The best Ps. for the table are of Fr. origin, such as the Mondain, Montauban, and Carneau.

Pigeon-flying. After 1871, following on the use of pigeons during the Paris siege, the sport became immensely popular, and there were few tns. which had not a P. club, many being enrolled under the National Homing Union, formed in 1896. In some of the races very high speeds have been made. In 1896 a bird flew from Thurso to London, 511 m., at the rate of 1454 yds. per minute. Birds have actually returned from a distance of 1000 m. Since the time of the Romans, homing pigeons have been used to convey messages in military operations. Pigeons were used extensively as messengers by both sides in the First World War; in the Second World War they were frequently used by the secret service and partisans, particularly in Yugoslavia. Aircraft of Coastal Command all carried at least one pigeon to establish contact with their base, should the plane be forced down and the transmitter wrecked.

Pigeon Pea, or *Cajanus indicus*, species of Leguminosae forming a genus in itself, and is known by other popular terms, such as dhal and Congo pea. It flourishes in India, where it is eaten like an ordinary pea.

Pigeon-shooting. The shooting of wood pigeons is a difficult sport on account of the natural shyness of the bird and its rapidity of flight. Shooting is generally done in the evening as the birds return to their roosting places in flocks. Another method is for the sportsman to conceal himself in the early morning in a wood where beech mast or acorns are plentiful, trusting to the presence of a few decoy birds to attract the pigeons within easy range. Trap shooting, the birds being suddenly liberated from a collapsible box, was prohibited in 1921.

Clay P. is shooting at a clay saucer

thrown into the air from a trap as a mark. The governing body in this country is the Clay Pigeon Shooting Association (Edgware, Middlesex) which organises a number of championships and an international tournament.

Pigeon, Wood, see CUSHAT.

Pig-footed Bandicoot, see *CHACROPIUS CASTANOTIS*.

Pig Iron, see under IRON AND STEEL.

Pigments, substances which are mixed with oil, water, and other vehicles to form paints. They differ from dyes in being insoluble; they should not react chemically to each other, or to their vehicles, or be affected by the air, water, heat, sunlight, gases, etc., with which they come in contact, or on which they are painted.

Inorganic Pigments.—Among the elementary substances used are all the blacks, i.e. carbon, ivory, lamp and charcoal black, Indian ink, graphite (plumbago or black-lead); also gold, aluminium, platinum, and silver, the last tarnishing with sulphur, rubber, sulphurous gases, etc. Zinc white, chromium green, burnt umber (iron and manganese), Venetian, light and Indian red, burnt sienna, red ochre (iron), cobalt blue (cobalt and aluminium), cobalt green (cobalt and zinc), cobalt black, ceruleum (cobalt and tin), and red lead, which is unstable and dries hard, are simple oxides. Yellow ochre, cappagh brown, raw sienna, raw umber (iron and manganese) are hydroxides, usually with clay or barium sulphate when pale; they are dried by warm air current or calcined. Zinc white has not much covering power and is thin. Viridian is an emerald-green chromium oxide. Prussian blue is prepared by oxidising Prussian blue. Sev. sulphides are in common use: vermilion (mercury), realgar and king's yellow (arsenic), cadmium yellow, antimony red. Those of arsenic and antimony are poisonous. All are liable to contain free sulphur and may react; emerald-green and lead chromes blacken cadmium yellow; vermilion is liable to blackening. An oxysulphide of zinc (Griffith's) is often mixed with zinc white. Chalk whitening (calcium) is a carbonate, white lead a hydrate and carbonate. The former is mainly an adulterant, the latter is useful in oils, but Freeman's white (the sulphate) or Griffith's, with zinc white, is substituted for permanence. Barium, zinc, lead, and strontium are also used in the chromate compound; the first is lemon chrome and permanent. They are rich in oxygen, and tend to become green by the formation of chromium green. Lead chromates are affected by sulphur compounds. Terre verte (iron, potassium, magnesium), a good natural green ochre, consists of silicates, as does smalt (cobalt and potassium). Barium sulphate is permanent; lead sulphate is contained in Freeman's white. Among other chemical compounds: Naples yellow (lead antimonate), not permanent; cobalt yellow (aureolin, cobalt, and potassium nitrites); Schweinfurt green (basic copper arsenite); tungsten green (chromium); Nuremberg violet

(manganese metaphosphate); cobalt blue (oxide and alumina); emerald green (aceto-arsenite of copper); Thénard's blue, cobalt violet (phosphates and arsenates of cobalt); ultramarine blue, Brunswick green (oxychloride of copper); Scheele's green (copper arsenite); Antwerp blue (iron and alumina); Prussian blue (iron ferro-cyanide). In recent years many entirely new types of Ps. have been prepared by the industrial chemist and adapted for specific uses. There is no sharp distinction between Ps. and dyes (q.v.). See also MONASTRAL BLUE and PHTHALOCYANINS.

Animal and Vegetable Pigments.—Indian lake, a resinous product produced by insect attack; crimson lake, purple lake, and carmine from the cochineal insect; yellow lakes from the bark of *Q. tinctoria*, and from Avignon and Persian berries; madder lakes and rose madder from the root of madder plant; gamboge, a resinous gum; indigo blue; sap green, from berries of buckthorn; sepia, from the cuttle fish. All these are liable to change due to oxidation in presence of moisture, light, and air, and also when mixed with chromates; this applies particularly to indigo, and the yellow and cochineal lakes. The yellow lakes are, many of them, vegetable acid dyes on stannic and aluminic bases. The various lakes produced by coal-tar derivatives are not valuable.

Preparation.—Picking over or separating grades by washing over is resorted to for obtaining purity of colour—as a rule grinding in turps, water or alcohol, linseed or poppy oil. In the case of water-colours, gum-water with or without glycerine is used. Roasting and calcining are resorted to drive off some impurities, or to alter the tone.

Adulterations.—These are not easy to detect; vinyl black is sometimes found to be ivory black with indigo; yellow ochre contains lead chromate; and terre verte, green ultramarine; red lead, red sulphide of antimony; lead sulphate, baryta white toned with eosin may be found in vermilion. These must be detected by chemical means after recovering the pigment and drying, the oil being removed by a solvent such as ether. White lead is soluble in dilute nitric acid, while barium sulphate, china clay, lead sulphate, its adulterants, are insoluble; whitening is also an adulteration of white lead.

Uses.—Although usually considered from the point of view of reliability in oil painting, and the knowledge thus obtained is as perfect as can be hoped, P. are in use for the art of temporary decoration or protective painting, such as the coating of iron and wood work, wall papers, distempers. Thus white and red lead, zinc white, are strong protectives, though lacking artistic permanence. Damp-proof, metallic, luminous, fire-proof, and anti-fouling paints are in common use.

See A. H. Church, *Chemistry of Paints*, 1901; E. J. Parry and J. H. Coste, *Chemistry of Pigments*, 1902; A. P. Laurie, *The Painter's Methods and Materials*, 1926; A. W. E. Harrison, *The Manufacture of Lakes and Precipitated Pigments*,

1930; C. A. Curtis, *Artificial Organic Pigments and their Applications*, 1930; and J. S. Remington, *Paint Laboratory Notebook*, 1935.

Pigments of Animals, see COLOURS OF ANIMALS.

Pigmies, see PYGMIES.

Pignatelli, Antonio, see INNOCENT (popes), Innocent XII.

Pignerol, see PINEROLO.

Pigott, Richard (1828-89), Irish journalist, b. in co. Meath. He supplied *The Times* with forged documents, which were in all good faith used by that newspaper as the basis of the articles 'Parnellism and Crime' in 1887. The Parnell Committee was appointed to investigate the matter, and the forgeries were exposed; whereupon P. fled to Madrid, and shot himself to escape arrest. See his *Personal Recollections of an Irish Journalist* (1882).

Pigou, Arthur Cecil (b. 1877), Brit. economist, educated at Harrow and King's College, Cambridge. He was successively Jevons memorial lecturer, Univ. College, London (1903-4); Girdler's univ. lecturer in economics, Cambridge (1904-7); prof. of political economy, Cambridge Univ. (1908-43). Among his many works *The "Curry of Unemployment"* (1933) is outstanding. The subject of the book is the disequilibrium that takes effect in unemployment, whether due to a change in the demand function for labour or to wage policy. It was described by Lord Keynes as 'the only detailed account of the classical theory of employment which exists.' In his work P. approaches the subject from the none-monetary or, as he calls it, the 'real' standpoint. He argues that it is possible 'to study the problem of unemployment either from the money end or from the real end. The two studies, if made complete and carried through correctly, must necessarily come to the same thing, their analyses meeting in the middle.' P. builds the monetary section of his theory of unemployment on a 'standard monetary system,' which he defines as one 'so constructed that, for all sorts of movements in the real demand function for labour or in real rates of wages, whether they last for a long time or a short, the aggregate money income is increased or diminished by precisely the difference made to the number of work-people (or other factors of production) at work multiplied by the original rate of money wages.' Other works include *The Economics of Welfare* (1920); *Industrial Fluctuations* (1926); *A Study in Public Finance* (1928); *Economics in Practice* (1935); *Socialism versus Capitalism* (1937); *Employment and Equilibrium* (1940); *Lapses from Full Employment* (1945); and *Income, an Introduction to Economics* (1946).

Pig-sticking, sport which developed in India, as bears, which had previously been hunted with spears, became locally extinct, and is now regarded as the premier sport of India. It is also practised in Central Europe and other parts of the world. There are sev. varieties of the Indian wild boar (*Sus indicus*), and

the best boars, though of great weight, are capable of immense speed, and in the chase take advantage of every form of cover and obstacle possible, leading the mounted pursuers over the most difficult ground. When overtaken and at bay, the boar fights with great fierceness and pluck.

Pika, tailless or piping hare (*Lagomys*), genus of rodents no larger than a guinea-pig, resembling the hares (*Leporidae*), though distinguished from them by the absence of a visible tail, short ears, and limbs nearly equal in length. They frequent the mountainous parts of Asia, but one occurs in E. Europe.

Pike, term applied to the members of the genus *Esox*, which is typical of the family Esocidae; they are fresh-water fishes and occur in the temperate parts of Europe, Asia, and America. In diet they are carnivorous, and prey on almost any animal they can obtain, from frogs and fishes to ducks, geese, rats, and foxes; their voracity is notorious. In colour the common P., *E. lucius*, is olive-grey above, silvery below, and has pale spots; in length it attains from 2 to 4 ft., and it is said to live for 250 years. Other names of this species are jack, hake, luce, and pickerel. *E. nobilior*, the maskinongy of N. America, may grow to a length of 8 ft. See G. W. Maunsell, *The Fisherman's rade mecum in most matters relating to Fishing for Trout, Sea Trout, Salmon, and Pike*, 1938, and J. Bickerdyke, *Angling for Pike*, 1949.

Pike, military weapon, consisting of a long shaft or handle with an iron head. Some such weapon had been in use from very anc. times, but the word itself dates from the fifteenth century. From that time it was in regular use as the arm of a large part of the infantry, who were called 'pikemen,' and was sometimes as long as 20 ft. It was gradually reduced in length, until in the seventeenth century it was superseded by the bayonet. The P. often had a spike at the end to enable it to be stuck in the ground. It was retained in the Brit. Army, for sergeants, until the end of the eighteenth century.

Pike's Peak, height in the Rocky Mts., in El Paso co., near Colorado Springs. It is about 14,100 ft. high, is partially covered with forests, and can be ascended by a rack railway.

Pila (Ger. *Schneidemühl*), tn. of Posen, Poland, 54 m. W. of Rydzysz. It is noted for glass, iron-castings, roofing material, and brick manufs. Pop. 21,000.

Pillar, port of Paraguay on the Paraguay R. Cotton, timber, and hides are produced in the vicinity. There are also cotton ginneries, distilleries, and saw-mills. Pop. 10,000.

Pilaster, engaged pier with a flat face furnished with base and capital. In Rom. buildings the P. is used only as a respond of a column, usually bearing one side of an arch. In revived classical work Ps. were used more frequently, and formed an important form of ornamentation. A P. is sly projects more than one-third of its surface breadth.

Pilate, Pontius, see PONTIUS PILATE.

Pilate's Staircase, see SANTA SCALA.

Pilatus, Mount, height of the Alps, on

the S. shore of Lake Lucerne, and between the cantons of Lucerne and Unterwalden. The Tomlishorn, its highest point, is 6998 ft., and its ascent can be made by means of a railway. Its name is from 'pileatus,' capped, and not from its being traditionally the scene of the death of Pontius Pilate.

Pilchard, or *Clupea pilchardus*, mallecopterogian fish in the large family Clupeidae, and is closely related to the herring and sprat. In size it grows from 10 to 14 in.; in colour it is bluish-green above, whitish underneath and on its sides. It is entirely marine in habit, and its eggs float on the surface of the sea, unlike those of the herring, which are attached to objects at the bottom. The young P., before it has attained maturity, is known as the sardine, and as such forms a valuable fishery; the full-grown P. is used as an article of diet as well as for bait. The method of capture is usually by drift-net. *C. pilchardus* is most abundant off the coasts of Portugal, and in the Eng. Channel and the Mediterranean.

Pileomayo, riv. of S. America. Its source is in Bolivia, about 60 m. N.W. of Potosi, on the E. slopes of the E. Cordilleras. Leaving the S. extremity of the Aullagas plateau it flows E. and S. through the Sierra region to the Bolivian Chaco and joins the Paraguay at Asunción. It has a length of 1300 m.

Pilea, genus of Urticaceae, also known as stinging nettle, dwarf foliage plants with small green leaves. *P. muscosa* is a creeper from the warmer parts of America and is sometimes known as *P. microphylla*.

Pile Dwellings, prehistoric habitations built on a platform supported on piles driven into the margins of lakes, rivers, or the sea. In Europe they are found in the Alps and in the Jura. The objects recovered from P. D. are often in a remarkable state of preservation, the mud or peat in which they are contained acting as a continuous water-bath. In this way the wooden handles of tools, and of weapons, wooden bowls, wickerwork, woven fabrics, fruit and even identifiable pollen grains have been recovered. Much is known of P. D. in the W. Alps which belong to the Neolithic period, and a type station is recognised at Rohenhausen on Lake Pfäfers, near Zürich. Fishing and hunting of deer and wild ox went side by side with the domestication of animals, the eating of fruit, and the growing of wheat and of flax for textiles. Tools and weapons were of stone, wood, and bone, and table-vessels were of wood and pottery. There was no naturalistic art, but representations of religious symbols are found. In Britain, the famous lake-vil. of Glastonbury represents the La Tène culture of the Early Iron Age. Strictly speaking it is not a vil. of P. D. but the terms are often used synonymously.

Piles, or *Hæmorrhoids*, swollen condition of the veins and tissues about the anus. P. are known as internal or external, according as to whether they are situated within or without the sphincter ani, the muscular ring which closes the

anal orifice. In the former case they are covered with mucous membrane, and may be so protruded as to escape through the anal orifice; in the latter case they are covered with skin, and may either form hard tumours or discharge as bleeding P. P. are a symptom of any condition by which the veins of the lower bowel become congested. Habitual constipation, the condition of pregnancy, growths in the rectum, general weakness, and local inflammation are liable to be accompanied by the formation of P. They may make their appearance after a strong effort at defecation, or after sitting on cold or wet ground. They may cause little trouble when quite hard, but if strangulated by the sphincter ani or inflamed by any cause they are apt to occasion extreme discomfort and lead to loss of blood to an exhausting degree. In most cases they submit to treatment in which scrupulous cleanliness, good bowel action, plain food, and soothing ointments have their part. Astringent injections may be tried if the hæmorrhage is excessive. As a last resort they may be removed by surgical operation, which usually consists of strangulating the bases of the P. by strong ligatures, in consequence of which the tumours slough off. Cancer (carcinoma) of the rectum is often mistaken for P., so that in all cases of doubt, and particularly in individuals over forty years of age, a complete rectal examination is indicated.

Pileus, name given in botany to the umbrella-shaped head of the mushroom and other fungi. The upper surface is usually rounded and convex, the under surface bears lamellæ or gills; the whole is borne on a thick stalk or stipe.

Pilgrim, name given to a person who travels for the purpose of visiting the shrines or tombs of holy men. *Pilgrimages* to Jerusalem, Bethlehem, and the other places which were the scenes of our Lord's life and death began at an early period, probably about the time of Constantine. Eusebius tells us that Helena, Constantine's mother, made a pilgrimage to Palestine and built the church of the Holy Sepulchre. But the Church writers of the time speak of pilgrimages with a grave note of warning on account of the many abuses to which the practice was liable. It increased tremendously in the Middle Ages, notably to the shrine of St. James at Compostella. Englishmen were particularly enthusiastic P.s. before the Reformation: numerous Eng. shrines, especially that of St. Thomas at Canterbury, were visited by Englishmen and foreigners. *Pilgrimages* are still common in the Rom. Catholic Church, the most popular shrine for this purpose at present being that of Our Lady at Lourdes. In the twentieth century pilgrimages to Our Lady of Walsingham, Norfolk, were revived by Rom. Catholics and Anglicans. See Bede Jarrett, *Catholic Encyclopedia*, 1907-12, and S. Heath, *In the Steps of the Pilgrims*, 1949.

Pilgrimage of Grace, rising which took place in 1536, in protest against the dissolution of the monasteries, but also against agrarian injustice resulting from

the enclosure movement. Its leader was Robert Aske, and it affected all the N. co., but especially Yorkshire and Lincolnshire. The insurgents took possession of York and then moved on to Doncaster some 30,000 strong. The rising was terminated in the next year by the execution of the leaders.

Pilgrim Fathers, name given to a party of 102 Puritans, of whom 74 were men and 28 women, members of John Robinson's church at Leyden, who, on Sept. 6, 1620, sailed from Plymouth in the *Mayflower* to seek freedom of worship for their own faith in New England. They landed on Plymouth Rock on Dec. 16, 1620, and their settlement later formed part of Massachusetts. See J. Brown, *The Pilgrim Fathers of New England*, 1920, and G. F. Wilson, *Saints and Strangers*, 1917.

Pilgrims, Anglo-Amer. dining club, existing to promote friendship between the two nations. The London branch was founded in 1902, the New York branch a year later. Traditionally each new Amer. ambas. to Britain makes his first public speech as ambas. to the P. The P. sponsored the erection of a statue in Grosvenor Square, London, to Franklin D. Roosevelt, 1948.

Pilgrims' Way prehistoric trackway linking E. Kent with the Winchester district. For the greater part of its course it runs along the escarpment of the N. Downs, above the spring-line at the junction of the Chalk rock and Gault clay, and its general line is marked by Canterbury, Chilham, Charing, Hollingbourne, Chevening, Guildford, and Winchester. It reaches the rampart of the Early Iron Age camp at Bigbury, near Canterbury, and is thus contemporary with or earlier than that earthwork. Coins of the Early Iron Age are associated with its route, and in Roman times, although its course was never straightened, it was used, as discoveries along its course show, for communication and trade. The alleged use of the road by medieval pilgrims to the shrine of St. Thomas at Canterbury is an antiquarian fancy and quite unproven after strict investigation. There is a large bibliography. See J. Cartwright (Mrs. H. Ady) *The Pilgrims' Way from Winchester to Canterbury* (1895 ed.), and H. Belloc, *The Old Road* (1911, 1935) for the popular tradition; and E. C. K. Erwood, *The Pilgrims' Road* (1923), and in *Archæologia Cantiana*, vol. 37, p. 1 for the now generally accepted view.

Pilgrim Trust, fund founded in 1930 by Edward Stephen Harkness, an Amer. citizen, who set aside a fund of £2,000,000, the interest on which was to be devoted to charitable causes in Great Britain, by way of recognition of the manner in which the country had fulfilled its obligations since the First World War. At the end of 1945 the market value of the trust's investments stood at £2,751,855. During the years 1940-45 £431,000 was disbursed in grants, £126,933 being for the welfare of H.M. Forces, the sick and wounded, prisoners of war, or civilians directly affected by the war. Among the trust's beneficiaries are Sir John Soane's Museum,

Abingdon Abbey, Ely Cathedral, St. Augustine's Abbey, Canterbury, Westminster Abbey monuments (including the proposed pub. of the Westminster 'Domesday').

Pilibhib, dist. of the United Provs., India. It borders Nepal, in the Rohilkhand div., and has an area of 1,553 sq. m. Pop. 490,700. There is a tn. of the same name. Pop. 35,000.

Piling. Piles are used to support the foundations of buildings and other structures where the ground is of unsound material, e.g. peat, alluvium, etc., or where structures such as wharves, jetties, etc., are most easily constructed on a piled foundation. For timber piles greenheart, elm, beech, jarrah, and pitch-pine are used. The heads are protected by a band of iron and the pointed ends by iron shoes. Reinforced concrete piles are now largely used in place of timber. Proprietary methods of P. include the driving of a steel shell or a mandrel, making possible the casting of concrete piles *in situ*. *Sheet piles* are flat piles of timber, reinforced concrete, or special steel section driven close together to form a retaining wall or a barrier that can be rendered watertight as a protection for other works under construction. The common apparatus for driving consists of a heavy ram working between slides in a timber framework. The ram is hauled up some 8 ft. by a rope and pulley and a small mechanism at the top releases it, so that it falls on to the head of the pile. For heavy rams a winch and chain is used, but steam-P. machinery is in general use now for important or difficult work. The Lacour, most commonly used, uses the cylinder itself as a ram, the piston rod resting on the pile head. Steam is fed into the cylinder at the top by means of flexible tubing from the boiler. At the top of the stroke steam is shut off, the exhaust opens, and the cylinder falls. Tubular or screw piles of cast iron or steel are sometimes used. Provided with a screw blade at the bottom, they are sunk by means of a capstan on the head or by a water jet. See R. V. Allin, *Resistance of Piles to Penetration*, 1935; R. D. Chellis, *Pile Driving Handbook*, 1944; D. H. Lee, *Sheet Piling, Cofferdams, and Caissons*, 1945; Amer. Society of Civil Engineers, *Pile Foundations and Pile Structures* (Manuals of Engineering Practice, No. 27), 1946; and *Kempe's Engineer's Year Book*, 1949.

Pill, small round mass containing one or more medicinal ingredients intended to act upon the stomach or intestines. It is a form especially applicable to those drugs which are taken in small doses, and recommends itself to most people on account of the ease in swallowing and the comparative absence of disagreeable taste. If the substance is not of a consistency adaptable to the P. form, it is mixed with a material termed an excipient, such as bread-crumbs, mucilage, trochee, soap, and conserve of roses. Where it is required to disguise the taste of any drug, Pa. are coated with sugar or other material. When they are required to act in the lower

intestinal region. Ps. are coated with keratin to delay solution.

Pillar, in architecture, a term of wider application than the term 'column.' It signifies any detached vertical mass, whether monolithic or built up in courses, constructed of any solid material. It may be used as a support for some superstructure or as a memorial column, whereas a column is, strictly speaking, a P. of fixed shape and proportions. Ps. in general may be of any shape in section and of various proportions. They are usually slenderer than columns, and are frequently octagonal in shape. Since the medieval Ps. were not regulated by the strict rules of proportion that governed the construction of the classical column, the two terms are used generally here to distinguish the work of the one period from that of the other.

Pillar Saints, see **STYLITES**, **ST. SIMÉON**.
Pillars of Hercules, see **HERCULES**.
PILLARS OF.

Pillau, seaport and former tn. of E. Prussia, 25 m. W. of Königsberg, on the Frisches Haff. It is engaged in fishing, and since 1946 has belonged to Poland, being called Baltisk. Pop. 7300.

Pillnitz, vil. in Saxony, on the Elbe, 4 m. S.E. of Dresden. In 1700 it became the residence of the Electors of Saxony, their palace being built a century later.

Pillory, instrument for the public punishment of malefactors, now obsolete. It consisted of a wooden frame (with circular holes for the head and arms), in which the prisoner stood. He sat in the stocks, exposed to the public view. It was found to be quite inadequate as a form of punishment, and abolished in England in 1837.

Pilocarpine, colourless oily alkaloid of the formula $C_{11}H_{15}O_2N$. It occurs in jaborandi leaves, is extremely poisonous, and is used in hair-restorers and medicine.

Pilot Fish, small subtropical fish of the horse-mackerel family (*Naucrates ductor*), about 12 in. long, spindle-shaped, steel blue in colour, and marked with five to seven dark vertical bars. It owes its scientific and popular Eng. name to its habit of accompanying ships and large fish, generally sharks, doubtless for the sake of food, for apparently the P. F. obtains much of its food from the parasitic crustaceans with which large fish are infested and also from the small pieces of food unregarded by the shark when it rends its prey. The old notion that the P. F. acted as a pilot and indicated to sailors the proximity of land is fabulous. It is the *pompilus* of the ancients and Ovid calls it *comes ratium* (*Italianica*, 101). The Ca'ing (q.v.) whale receives its alternative name, pilot-whale, from the fact that if the leader happens to run ashore the whole school usually follows.

Pilot Officer, see **RANK**, *Royal Air Force*.

Pilots (Sea), strictly speaking, persons not belonging to any particular ship who are authorised to conduct ships through certain rvs., roadsteads, or channels, or into certain ports, and who are usually

taken on board at a particular place for that purpose only (*MacLachlan's Law of Merchant Shipping*). P. may be either licensed or unlicensed. A licensed pilot is one who holds a licence, issued by the pilotage authority for the dist., to act in the limits named in his licence. A licensed pilot is always empowered to supersede an unlicensed pilot, and a master who knowingly employs an unlicensed pilot after a licensed pilot has offered to take charge of the ship, or signalled for that purpose, is liable to a fine, as is also the unlicensed pilot, for knowingly continuing to act in such circumstances. A ship, whilst navigating in a dist. in which pilotage is compulsory, for the purpose of entering, leaving, or making use of any port in that dist., is required to be either under the pilotage of a licensed pilot of the dist., or under the pilotage of a master or mate possessing a pilotage certificate for the dist., who is bona fide acting as master or mate of the ship. A ship carrying passengers (other than an excepted ship) is, however, compelled to be under pilotage irrespective of whether the dist. in which it is navigating is a compulsory one or not. The Corporation of Trinity House is the prin. pilotage authority of the United Kingdom and has the control of all matters relating to pilotage in the port of London and forty other dists., including Southampton; other dists. are controlled by their own local pilotage authorities. The law relating to P. and pilotage is now consolidated in the Pilotage Act, 1913. By Section 11 of this Act the following ships are excepted from compulsory pilotage: (1) ships belonging to his majesty, (2) pleasure yachts, (3) fishing vessels, (4) ferry boats, (5) ships of less than 50 tons gross tonnage, (6) ships exempted by by-law, (7) tugs, dredgers, sludge vessels, barges, and other similar craft belonging to or hired by a dock, harbour, or riv. authority, (8) ships calling at a port in a pilotage dist. for the sole purpose of taking on board or landing a pilot belonging to some other pilotage dist. The Pilotage Authority makes the necessary by-laws for the regulation of pilotage and P. in its dist., but these do not take effect until they are confirmed by the minister of transport. The Ministry of Transport has the power, on the representation of parties interested, to revoke or vary any by-laws in a pilotage dist., or require the pilotage authority to make by-laws. A pilotage authority may grant a pilotage certificate to any person who is bona fide the master or mate of any ship if after examination they are satisfied that having regard to his skill, experience, and local knowledge he is capable of piloting the ship of which he is master or mate within their pilotage dist. Under the Aliens Restriction (Amendment) Act, 1918, pilotage certificates cannot be granted to aliens, except to masters or mates of Fr. nationality trading to the ports of Newhaven or Grimsby. See also **MERCHANT SHIPPING ACTS**.

Pilpay, legendary Indian philosopher, see **BIDPAI**.

Pilsen, see **PLZEŇ**.

Pilsudski, Joseph Clemens (1863-1935), Polish statesman and soldier, b. at Vilna, and educated at Vilna and Zharkov, where he developed Socialist sympathies, being deported to Siberia in 1887. In 1892 he settled at Lodz, where he joined the newly formed Polish Socialist party, which aimed primarily at liberating Poland from Russian rule. He was re-arrested, but escaped and settled at Cracow, where he worked to form a Polish legion for his country's deliverance. At the beginning of the First World War, P. invaded Russia at the head of his legion, but in 1916 Ger. military methods caused him to resign his command and he was subsequently arrested and interned at Magdeburg. Freed by the armistice in 1918, P. became president of the new Polish republic in the following year, receiving the rank of marshal. He co-operated with Gen. Judenitch in an advance against the Bolsheviks on Lenin-grad, but the campaign failed. In 1920 P. carried out a rapid advance against the Bolsheviks across the Pripiet marshes on Kiev. His advance was, however, checked at Kiev, and his armies eventually driven back on Warsaw. With the advice and operation of the Fr. general, Weygand, and the Brit. general, Sir P. de B. Radcliffe, he was able to ward off the Bolshevik attempt to capture Warsaw as a pawn in the peace negotiations. After the conclusion of peace with the Bolshevik Gov., P. lost favour and temporarily retired. In 1926 he overthrew the gov. by a military coup d'état, and became prime minister from 1926 to 1928 and again for a brief period in 1930. From 1926 until his death he was minister of war, and during this period the Polish constitution was altered until it became, in effect, a dictatorship. He concluded a non-aggression pact with Nazi Germany in 1931. Throughout his military career he regarded the Bolsheviks as merely Russian imperialists under another name, and was ready, both before and during the First World War, to serve the Austrian emperor if by so doing he could obtain arms and equipment for his Polish legionaries, who later became, through his efforts, the governing factor in Polish politics. Intensely but narrowly nationalist, P. could only conceive a nation as a people's army, and his pupils and successors, Beck and Smigly-Itz, learned to despise politicians and the forms of W. European democracy. Among his books are *Rok* (1920) and *Historical Corrections* (1931). See lives by R. Landau, 1931; E. J. Patterson, 1935; and F. Riddaway, 1939.

Pitdown Man, or *Eoanthropus Dawsoni*, named from the accidental discovery in 1912 at Pitdown, Sussex, England, of fragments of a primitive human skull. Bones of primeval animals, rough flint tools, and a pointed tool of elephant bone were also found. The remains represent one type of human alive at the beginning of Pleistocene times, but he does not find a place in our own direct family tree. See ANTHROPOLOGY.

Pima, Amer. Indian tribe in Mexico

and N. America, estimated to number about 12,000. They inhabit the W. coast and Sierra Madre areas of Mexico and Arizona, from the R. Gila to Jallisco in the S. They are agric. and noted for their pottery and basket-work; but in the eighteenth century they were one of the most warlike tribes, frequently revolting against Sp. rule.

Pima Languages, see under NORTH AMERICAN NATIVE LANGUAGES, *Pacific Areas*.

Pimelea, genus of Thymelacae, occurs in the Australasian regions. There are in all eighty species, most of which are trees bearing flowers in heads.

Pimentel, port and summer resort of Peru, 8 m. from Chiclayo. Pop. 2000.

Pimento, genus of Myrtaceae, occurring only in tropical America. There are in all five species, and the most important of these, *P. officinalis*, is cultivated for its fruits, which, when still unripe, are dried and form all-pice.

Pimlico, residential dist. of London, lying between Westminster and Chelsea, 2½ m. W.S.W. of St. Paul's. In P. are situated Buckingham Palace and Gardens. The name is believed to have originated in an inn resembling one of the same name at Hoxton, called after the lt. proprietor.

Pimpernel (*Anagallis*), genus of annual, biennial, and perennial plants of trailing habit (order Primulaceae), bearing small, often numerous, red flowers. The common P. or poor man's weatherglass (*A. arvensis*) occurs in most cornfields; varieties of it are grown on rockeries. The bog P. (*A. tenella*) is a tiny but beautiful bog plant with rose-pink, funnel-shaped flowers. The yellow P. is *Lysimachia nemorum*, a pretty woodland plant with bright yellow, star-like, solitary flowers.

Pimpinella, or **Burnet Saxifrage**, genus of annual and perennial plants (family Umbelliferae). *P. saxifraga* and *P. major* are Brit. plants. The fruit of *P. anisum* is the aniseed of commerce.

Pinakothek, gallery in the Propylaea, in anc. Athens, where consecrated treasures were kept. Imitations of it were built in Munich by Louis I. of Bavaria in 1836 and 1853 to house art collections.

Pinar del Rio: 1. Extreme W. prov. of Cuba. The chief products are tobacco, which is of the finest quality, sugar, coffee, rice, wood, and corn. There are rich mineral deposits. Area 5211 sq. m. Pop. 398,800. 2. Cap. of the above prov. 95 m. W.S.W. of Havana, having an important tobacco trade. It makes the best cigars and Vuelta Abajo leaf tobacco. Pop. 64,900.

Pinchbeck, reddish-yellow alloy of copper and zinc, the average proportion in which the metals enter into it being 90 per cent copper and 10 per cent zinc, but the composition is very variable. It was much used formerly in the manuf. of cheap jewellery and watch-cases and is said to have been invented by Christopher P., an eighteenth-century London watch-maker.

Pinckney, Charles Cotesworth (1746-1825), Amer. statesman and soldier,

b. in Charleston, S. Carolina. The son of a wealthy planter, he was educated at Oxford Univ. and at a military college in Caen, France. Returning home he practised at the Bar in his native city, became a member of the S. Carolina prov. legislature, an officer in the S. Carolina militia, and president of the S. Carolina Senate. Serving with the army of the Amer. colonists in their war with England, he was captured in 1780 and held prisoner for nearly two years. A leading figure in the Amer. constitutional convention, he opposed anything that would make for the abolition of slavery. In 1796 he was sent as Amer. minister to France at one of the most troubled periods of the young republic, but the Fr. Gov. refused to receive P., and he had to take refuge in Holland. Later President John Adams sent him back to France, accompanied by John Marshall and Elbridge Gerry. The mission was not acceptable to Talleyrand unless certain conditions were fulfilled; and when the facts became known in America (1798) there was a popular demand for an immediate declaration of war on France. The Fr., immensely surprised at the spirit of the young country, withdrew their demands. P. was the nominee of the Federalist party for vice-president in 1800 and for president in 1804 and 1808, but was defeated each time.

Pindar (Πίνδαρος) (518-443), greatest of Gk. lyricists, was descended from the nobility of Thebes. He learnt from his uncle Scopelinos, then from lyric poets at Athens, and also from his countrywoman Corinna, who is said to have warned him to sow his mythological detail 'by the handful, not the sackful.' His earliest extant poem (*Pythian* x) dates from 498; in the next forty years he became a famous figure throughout the Gk. world, from Sicily to Rhodes, from Macedonia to Cyrene. His works were collected in seventeen books and included hymns, psalms, dithyrambs, procession songs, maiden-songs, hyporchemata, encomia, dirges, and epinicians (odes for victors in the Games). These last, in four books, have survived complete; of his other poetry we have only fragments, latterly augmented by papyri. P.'s power lies not in his ideas, which are often naive and muddled, but rather in an amazing splendour of language, rhythm, and imagery, which has made his poetry impossible to translate, and fatal to imitate. This praise of athletes was indeed one of the most purely æsthetic writers there have ever been. The only value of his moralising for the modern reader lies in a grace and magnificence of phrase and symbol such as few poets in the world have attained. See eds. by A. Puech, 1922-23; L. R. Farnell, 1930-32; J. E. Sandys, 1937; and C. M. Bowra, 1947; also B. L. Gildersleeve, *Olympians and Pythians*, 1885; J. B. Bury, *Nemean*, 1890, and *Isthmians*, 1892; C. A. M. Fennell, *Isthmians and Nemean*, 1899; and trans. by E. Myers, 1874; C. J. Billson, 1928-30; L. R. Farnell, 1930-32; J. E. Sandys, 1937; and R. Lattimore, 1947. See U.

von Willamowitz-Moellendorf, *Pindaros*, 1922, and G. Norwood, *Pindar*, 1945.

Pindar, Peter, see Wolcott, John.

Pind Dadau Khan, fn. of W. Punjab, Pakistan, 1 m. from Jhelum. There is considerable local trade in salt. P. D. K. was founded by Dadau Khan in the seventeenth century.

Pindemonte, Ippolito (1753-1828), It. poet, b. at Verona, of a rich and cultured family. Early in life he displayed poetical taste and ability, and travelled in Switzerland, England, Germany, and France (1788-90). In 1789 he pub. *La Francia*, on the Fr. Revolution. His prin. works are the *Poesie Campestri* (1788), filled with charming descriptions of Brit. scenery; *Arminio*, a tragedy (1804); *Epistole and Satire* (1805), dealing with contemporary events; *Dodici Sermoni poetici* (1808); *Elogi di letterati* (1859) composed in fine prose, etc. They are all more or less tinged with melancholy, and graceful and classic in manner. See monographs by L. Allierino, 1874; S. Gini, 1899; S. Peri, 1904; M. Scherillo, 1919; and O. Bassi, 1934.

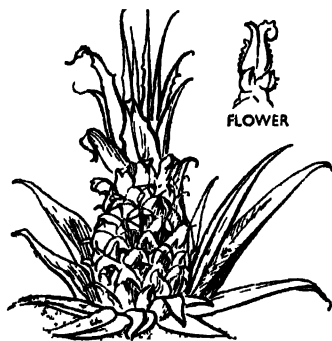
Pindus, range of mts. in Greece, forming the boundary between Thessaly and Epirus. (Greatest height, 7665 ft. In the Second World War the Brit. forces fought Ger. and It. forces in the P. gorges in Nov. 1940.

Pine (*Pinus*), large and important genus of coniferous trees. The only Brit. native is the Scottish P. (*P. sylvestris*), a beautiful tree which grows well upon deep, loose, sandy soil. Other Ps. grown for profit in Britain are the Corsican (*P. Laricio*), Austrian (*P. austriaca*), and Weymouth (*P. Strobus*). Except in the coldest parts of Britain the Corsican P. outgrows the Scottish P. both in height and girth, and can bear a greater degree of shade, while of all conifers it is least attacked by rabbits. The Austrian P. is sometimes planted on poor limy soil. The pitch P., a native of S. N. America, and perhaps the most valuable of all Ps. is too tender for the Brit. climate; besides its valuable well-known timber, it yields turpentine, pitch, tar, and resin. The Bankian P. thrives on the poorest soil, and has been largely planted in Germany. The stone or parasol P. is cultivated in Italy for its large edible seeds. Another Mediterranean species, the cluster or maritime P. (*P. pinaster*), is extensively planted on sand dunes, which it binds together with its roots, acting also as a valuable wind break.

Pineal Gland, or Pineal Body, small reddish gland situated behind the third ventricle and connected with the optic thalamus by two nervous structures called peduncles. The function of the pineal body is not known, but it is homologous with a rudimentary third or median eye found in certain lizards. Some physiologists regard it as a ductless gland, though there is no adequate evidence.

Pineapple (*Ananas sativa*), fruit of a tropical Amer. plant which is easily grown in the stovehouse. The flowers, surmounted by a crown of spiny leaves, are borne on spikes which rise from the centre

of the plant. There are numerous varieties of the fruit, and those of the finest flavour are home grown, but the fruit now hardly pays for culture in Britain.



PINEAPPLE

Pine Bluff, city in Jefferson co., Arkansas, U.S.A., on the Arkansas R., 40 m. S.E. of Little Rock; it has cotton and lumber mills and iron works. The Merrill Institute is here. Pop. 21,300.

Pinel, Philippe (1745-1826), Fr. physician, b. at Saint-André, and after receiving a good classical education at the college of Lavaur, removed to Toulouse, where he studied medicine. Having applied himself with success to the study of mental alienation, he was charged, in 1791, to make a report on the insane inmates of the Bicêtre, became chief physician of this institution in 1793, and in 1795 was chosen to the same office at the Salpêtrière (asylum for females). P. gained fame by his reformation of the old barbarous methods of treating the insane.

Pine Marten, *Mustela martes*, member of the genus *Mustela*, allied to the weasel and badger, constituting a special sub-family of the *Mustelidae*, distributed over the Old World, but now rare in Britain. The body is long and lithe, about 18 in., with a tail of about 12 in. The legs are short; the paws have five digits armed with claws. The fur is dark brown, lighter on cheeks and on the sharp snout; the throat and under side of neck are yellow. It is arboreal, and frequents coniferous woods, whence its popular name.

Pinene, chief constituent of turpentine, is a hydrocarbon of the formula $C_{10}H_{16}$. It is a colourless mobile liquid (boiling point $156^{\circ}C.$, sp. gr. 0.86). It occurs in pine-trees and also in many essential oils (e.g. those of laurel, lemon, and sage). Like ethylene it forms a crystalline dibromide, and also forms other additive compounds, such as P. hydrochloride and P. nitroso-chloride. It readily oxidises, yielding various products, including terephthalic acid, terpenylic acid, etc. It is a useful solvent for resins.

Pinero, Sir Arthur Wing (1855-1934), Eng. playwright, b. at Islington, and

educated at private schools. He went on the stage in 1874 and acted with Sir Henry Irving and others until 1881, when he retired and devoted himself exclusively to play-writing. His earlier plays were farces and comedies, in which the author often satirised the follies and fads of the day. Among these plays, which almost without exception were successful, were *The Magistrate* (1885); *The Schoolmistress* (1886); *The Hobby Horse* (1886); *Sweet Lavender* (which had a very long run with Edward Terry as Dick Phenyl, 1888); *The Profligate* (1889); *The Weaker Sex* (1889); *The Cabinet Minister* (1890); and *The Times* (1891). In *The Second Mrs. Tanqueray* (1893) P. took a more serious subject, his treatment of which was no doubt influenced by the growing vogue of Ibsen. Encouraged by the success of this 'problem play,' P. frequently took subjects of considerable importance for his themes, and produced *The Notorious Mrs. Ebbensmith* (1895); *Iris* (1901); and *Lottery* (1903). A play of P.'s that pleased people not often pleased by him was *Trelawny of the Wells* (1898). In it Irene Vanbrugh made her reputation, and repeated her success in P.'s *The Gay Lord Quex* (1899). *A Wife Without a Smile* (1904) was not popular. *Mid-Channel* (1909) was hailed as a masterpiece by Wm. Archer, to the astonishment of many. P. always excelled in construction; indeed the neatness of his finish betrays the Ibsen influence. He acted in a number of other plays until 1930. P. was knighted in 1909. See H. Fyfe, *Sir Arthur Pinero's Plays and Players*, 1930, and W. D. Dunkel, *Life and Letters*, 1943.

Pinerolo, or **Pignerol**, tn. in Piedmont, Italy, 22 m. S.W. of Turin, and the seat of a bishopric. It was prominent in the seventeenth century as a Fr. fortress and a place of confinement for political offenders, the Man in the Iron Mask being imprisoned here. Cloth, silk, and leather goods are manufactured. Pop. 15,400.

Pines, Isle of, dependency of New Caledonia, a Fr. Pacific colony. It is 30 m. S.E. of New Caledonia, has an area of 53 sq. m., and a pop. of about 500.

Pine Tree Flag, flag having a white field with a device in green of a pine-tree, first used by the Massachusetts colony in the early eighteenth century, carried by the first vessels of the colonies in the Amer. Revolution.

'**Pine Tree State**,' see MAINE.

Ping Pong, see TABLE TENNIS.

Pinguicula, genus of Lentibulariaceae, contains about thirty species, of which three grow in Britain and are known as butterwort. *P. lusitanica* is a native of Portugal and W. Britain, *P. vulgaris* is the common species. *P. grandiflora* grows in Irish bogs and has large, deep purple flowers.

Ping-yang (Korean **Phyong-yang**), walled city of Korea, cap. of the prov. of Phyong-yang, on the Ta-tong R., 36 m. from its mouth. It is said to date from 1122 B.C., and was the scene of great battles between the Chinese and Jap. in 1592 and 1894. Pop. 75,000.

Pink, see CARNATION; DIANTHUS.

Pinkerton, Alan (1819-84), Amer. detective of Scottish origin, b. at Glasgow. He emigrated to Chicago, where he estab. the agency which bears his name. He was appointed to the U.S. secret service in 1861, and was prominent in many celebrated cases, assisting in breaking up the 'Molly Maguires.' Later he was employed as special detective on the great Amer. railways. He pub. sev. detective stories in which his exploits were narrated. See R. W. Rowan, *The Pinkertons*, 1931.

Pinkerton, John (1758-1826), Scottish historian, b. in Edinburgh, and trained for the law. After publishing some ballads he turned to historical studies and pub. many books on the subject. Among his works are *An Essay on Medals* (1784); *A Dissertation on the Origin and Progress of the Scythians or Goths* (1787); *The History of Scotland from the Accession of the House of Stuart to that of Mary* (1797); and *Modern Geography* (1803, 1817). His *Literary Correspondence* was pub. in 1830.

Pink Eye, Oedematous, or Exudative Cellulitis, form of influenza in horses, characterised by swollen legs and eyelids, the lining membrane of which, as of the nose and mouth, becomes pink. The animal is very languid and the temp. rises. The name is also given to a very infectious form of catarrhal conjunctivitis which is found at intervals in schools and other institutions. It must be regarded and treated as other epidemics of infectious diseases. The outbreak usually dies down in about two weeks.

Pinkie, locality near Musselburgh, Midlothian, Scotland, the scene of the defeat of 23,000 Scots, under the Regent Arran, by half the number of Eng., under the Protector Somerset, Sept. 10, 1547. P. House was built in the fifteenth century. Its reconstruction by Alexander Seton in 1613 exemplifies the Anglicising of Scottish architecture resulting from the union of the Crowns. In the reconstruction the growing influence of the Renaissance is evident. The painted gallery is noteworthy, being decorated in the early seventeenth century.

Pinking, detonation, explosion of petrol-air mixtures in the cylinder of internal combustion engines, caused by too high a compression ratio. It may be overcome, at least in part, by the addition to the petrol of 'anti-knocks' such as aromatic hydrocarbons, alcohol, or lead tetraethyl (q.v.).

Pink-root, or Indian Pink (*Spigelia marilandica*), species of Loganiaceae which grows in America. The roots have anthelmintic properties. It is also known as Wormgrass.

'Pink Un.' see 'SPORTING TIMES.'

Pinna, genus of pseudolamelli-branchiate molluscs related to the pearl-oysters in the family Aculiidae, and the species are popularly termed wing-shells. Some species attain a length of about 2 ft., and the long, delicate byssus is sometimes woven into cloth.

Pinnace, formerly a small two-masted vessel, fully rigged, and employed as tender to large ships. In the Brit. Navy

the term is applied to an eight-oared boat larger than a cutter and provided with sails. All Brit. men-of-war now carry motor Ps.

Pinos, Isla de, is. in the W. Indies, 37 m. S. of Cuba, of which it is a dependency; it has marble quarries, and produces fruit, cattle, tobacco, sulphur, turpentine, and tortoiseshell. It was discovered by Columbus in 1494, and was long notorious as a pirate stronghold. It was regarded as a part of Cuba by the U.S.A., who relinquished their claim to it in a treaty signed in 1925. Santa Fé is the cap., and has mineral springs. Vegetables and grapefruit are cultivated. Area 1180 sq. m. Pop. 4300.

Pins. The earliest P. were doubtless thorns. Bone P. and bronze P. have been found dating from prehistoric times. Some of these old P. have ornamental heads, others are shaped like hairpins, and some of the 'safety' type have been found. In 1483 the importation of P. into England was forbidden, but until 1628, when John Tilley started the manuf. of P. at Stroud, most of the P. used in England were obtained from France. The London Pinmakers' Corporation dates from 1636. The chief centre of the trade is Birmingham. The machine patented by Wright in 1824, apparently on the lines of Seth Hunt's patent in 1817, revolutionised the pin industry when improved by Shuttleworth and Tyler. The old form of pin had the head made separately from the shank, attached thereto by wire. In the manuf. of the present solid-headed P. wire of a suitable gauge runs off a reel, and is nipped between lateral jaws at the required point. It is headed by a die, and pointed by a revolving cutter, at the rate of 360 per min. Brass P. are 'boiled white' with a solution of oxalic acid, argol, water, and alternate layers of grain tin after being scoured in barrels with the solution from the boiling white of the previous load, with the addition of fuller's earth. Iron P. are scoured in a weak solution of cyanide, potash, and water, then electro-plated with copper. Brass and iron P. are washed, dried, and polished in sawdust. Mourning P. are dipped in black japan, then baked. Safety P. are also made by machinery.

Pinsk: 1. Region of the Byelorussian S.S.R. 2. Tn. of the Byelorussian S.S.R., at the junction of the Pripiet and Pina Rts. The marshes near by are unhealthy. Before the Ger. invasion in 1941 there were potteries, breweries, tanneries, and brick-works there, and trade was carried on in corn, tallow, tobacco, linseed, and salt. P. was heavily damaged in the First and Second World Wars. Pop. 42,000.

Pint (from Lat. *pincta*, *picta*, a painted or marked vessel; Fr. *pinte*), measure of capacity, especially for liquids, also sometimes for dry goods, equal to $\frac{1}{4}$ quart or $\frac{1}{2}$ gallon (34.659 cubic in., 57 litre). The Scottish P. contained over three imperial Ps. The U.S. standard P. contains only .47 litre. In medicine a P. is equivalent to twenty fluid ounces.

Pintail Duck, or Sea-pheasant (*Querquedula acuta*), handsome Brit. wild duck with a long tail, the two middle feathers of which

in the male taper to a sharp point, projecting some five inches beyond the others. The head is brown, the upper parts dark grey, with narrow black stripes, and the under parts white. It breeds in Scotland and Ireland, and visits the E. coast of England in the winter, where, when domesticated, it readily pairs with other ducks. Its migratory range is very extensive.

Pinto, Fernão Mendez (1509-83), Portuguese adventurer, *b.* at Montemor-o-Velho. In 1537 he set out to try his fortunes in the E., and travelled for twenty-one years in S.E. Asia, fighting and trading in China, Tartary, and the neighbouring countries, and going on a special mission to Japan in 1542-43. He was the friend and travelling companion of St. Francis Xavier. In 1558 he gave up his wanderings and returned to Portugal, where he married and wrote his famous book, *Il Peregrinação*, pub. in Madrid in 1614. There is an abridged and illustrated trans. by Arminius Vanbery, 1891, and *Portuguese Voyages*, 1498-1663, ed. by C. D. Ley (Everyman's Library) contains a long extract from P.'s famous travel book. See life by M. Collis, 1949.

Pinto, Serpa, see SERPA PINTO.

Pinturicchio, Perna lino, or **Bernardino di Betti** (1454-1513), lt. painter, *b.* at Perugia. He assisted Perugino with his frescoes in the Sistine Chapel, and was engaged by various members of the Rom. nobility to decorate their palaces. He also decorated a whole series of chapels in the church of S. Maria del Popolo in Rome. The most striking of his frescoes are those in the cathedral library at Siena, representing the hist. of Pope Pius II. Other frescoes in Rome, still existing in a genuine state, are those in the Cappella Bufalini, probably executed from 1497 to 1500. See G. B. Vernigiglioli, *Memorie di Pinturicchio*, 1837; Schmarsow, *Pinturicchio in Rome*, 1882; and life by W. Bombe, 1912.

Pinwell, George John (1842-75), Eng. water-colour painter and black-and-white artist, *b.* at Wycombe. He was one of the most successful book illustrators of his day. His chief productions were illustrations of Goldsmith, Jean Ingelow's poems, the *Arabian Nights*, etc. His prin. water-colour paintings are two scenes from 'The Pied Piper of Hamelin,' 'The Elixir of Life,' 'A Seat in St. James's Park,' etc. See life by G. C. Williamson, 1900.

Pinzon, Martin Alonso (c. 1440-93), Sp. navigator, companion of Columbus, in whose first expedition (1492) he commanded the *Pinta*. After their landing at San Salvador (Watling Is.) he separated from Columbus for a time, and discovered Haiti, returning to Palo in Andalusia on the same day as Columbus, of whose success he was said to be envious (see F. Asensio, *Estudio historico*, 1892). He was the first Sp. navigator to cross the equator (1499-1500), discovering Brazil and the mouth of the Amazon. With Solís (1506) he explored the gulf of Honduras and S.E. Yucatan and the E. of S. America (1508). See C. F. Duro, *Colon e Pinzon*, 1885.

Piombino : 1. Tn. in the prov. of Leghorn, Italy, opposite Elba. P. was once the seat of a principality. Ruins of the anct. Populonia are near by (N.). There are iron-rolling mills. The *fortezza* was damaged by bombs in the Second World War. Pop. 10,000. 2. Former principality of N.W. Italy, now part of Leghorn prov. which from 1399 to 1603 belonged to the Applani family. It was ceded to France (1801). Elisa Baciocchi received it from her brother, Napoleon I. (1805), and it was joined to Tuscany (1815).

Piombo, see SEBASTIANO DEL PIOMBO.

Pioneer (military) (Fr. *pionnier*, foot-soldier), in Brit. infantry organisation, a military artisan employed in peace-time, in such work as painting and repairing barrack-rooms. Formerly, in war, the P. was one of a body of foot soldiers, generally in the ratio of ten to every battalion, who marched in advance with pickaxes, spades, and other tools to prepare the road or remove obstructions for the main body of the troops or to do other minor engineering or constructive work. In the former Brit. Army in India there were whole battalions called Ps., who were in effect lightly-equipped engineers, but who also fought as infantry. In 1922 on the reorganisation of the old Indian Army the P. units were converted into regiments. There is in existence in the Brit. Army organisation a Royal P. Corps (*q.v.*), and there are P. platoons in infantry battalions.

Pioneer Health Centre, unique 'laboratory for the study of human biology,' originally opened in a small house in Queen's Road, Peckham (London, S.E. 15), in 1926. A 'Family Club' was formed, and all married couples (with or without children) were invited to join, at a family subscription of 1s. weekly. More than a hundred families joined in the three years that this first experimental Health Centre was open, and the question had been answered that, given suitable circumstances, there were families who would welcome a health service distinct from any sickness service. The periodic health overhauls, which were and are the main condition of membership, showed that, while sickness might be detected in an individual far earlier than expected, overhaul and treatment are ineffective to regain full health without 'instruments of health' providing conditions in and through which the biological potentiality of the family can find expression. It was decided to close the small centre and to plan a larger enterprise, which would not only extend the previous service but also provide a new social structure with available circumstances and material to vivify the health of the member-families. In May 1935 this new centre was opened in Peckham. The building itself is mainly of concrete and glass, consisting of three large platform: 160 ft. by 120 ft., cantilevered one above the other over parallel rows of supporting pillars. A large swimming bath forms the middle of the ground floor, and may be seen from most parts of the building. In addition to the bath, the

ground floor has a gymnasium, theatre, nurseries, learners' bath, cloakrooms, etc. The only part cut off from general circulation is the consultation block on the top floor, containing private consulting rooms, reception rooms, changing rooms, and a bio-chemical laboratory. The rest of this floor is made up of large light open spaces for games or recreations of any kind. A large social hall shares the first floor with the cafeteria, where, as everywhere in the centre, self-service is the rule: there are no waitresses or attendants, only the 'curators' and doctors to give advice and to study their 'guinea-pigs' in a living society. The whole building is characterised by a design which invites social contact of all kinds; the chance meeting, the organised festive or formal occasion, or the quiet family grouping. Facilities are available for all kinds of recreation: swimming, badminton, table tennis, billiards, roller-skating, reading, chess, jig-saw puzzles, and so on. For children of member families, all these are free, though for adults certain small fees are charged. Before the centre closed, in 1939, the revenue from these fees and the family subscriptions was about £7000 a year. During the Second World War the building was used as a factory and much of the equipment was lost; the doubling of expenses necessitated the increase of the subscription to 2s. The number of member-families was 900 before, and 700 after, the War. The centre could take 2000 were it in a financial position to acquire the necessary equipment for that number of families. The P. H. C. is an experiment, and as such has been built, equipped, and to a large degree maintained by the voluntary subscriptions of those who use it and believe in it. Moreover it is the first of its kind anywhere in the world, and as such has had the difficulties attendant on new and unusual ventures. See G. Scott Williamson and Innes H. Pearse, *The Case for Action*, 1931, and *Biologists in Search of Material* 1938; Innes H. Pearse and Lucy H. Crocker, *The Peckham Experiment*, 1943; and G. Scott Williamson, *Physician Heal Thyself*, 1935.

Piotrkow, tn. in the prov. of Lodz, Poland, situated 25 m. from Lodz, on Strawa R., with ruins of an auct. royal castle. Before the Second World War there were foundries, tanneries, and textile factories. Pop. 31,300.

Plozzi, Hester Lynch (earlier Thrale) (1741-1821), b. at Bodvel, Carnarvonshire, daughter of John Salusbury, of Flintshire. She married in 1763 Henry Thrale, the brewer, and soon after became an intimate friend of Dr. Johnson, who frequently stayed at the Thrales' house at Streatham, and travelled with them. Thrale d. in 1781, and three years later the widow married Gabriel P., a musician. She wrote in 1788 *Anecdotes of the late Samuel Johnson, LL.D.*, and two years later pub. her correspondence with the great man. She also wrote *The Three Warnings* (1766), a poem which is said to have been partly Dr. Johnson's work. See *The Intimate Letters of Hester Plozzi*

to *Penelope Pennington, 1782-1821* (O. G. Knapp, ed.), 1913, and O. E. Vulhamy, *Mrs. Thrale of Streatham*, 1936.

Pipa Americana, or Surinam Toad, large, tongueless toad, the only representative of its genus and family, and peculiar to Dutch Guiana. Its most remarkable feature is the hatching of the eggs each in a small pouch on the back of the female, where they are placed by the male, and adhere by a glutinous secretion, gradually becoming imbedded in the epidermis. The eggs are hatched and the metamorphosis of the young is completed before they escape. The toad's head is broad and pointed and the body is brownish-olive.

Pipal, or Peepul, see BO-TREE.

Pipe, measure of quantity used in Great Britain, France, Spain, Portugal, and U.S.A. for liquids, especially wine and oil. Formerly it was a large cask or vat for wine or other liquids, and even for provisions (fish, eggs, meat, etc.). It contains 2 hogsheads, 4 barrels, or 1 tun, and is sometimes used as equivalent to a 'butt' of ale or beer. The common Eng. P. contains 105 imperial or 126 wine gallons. The capacity of a P. varies according to the wine contained, a P. of Madeira containing about 110 wine gallons, of sherry 130 gallons, of port 138 gallons.

Pipe (music), cylindrical instrument with holes through which air passes, making musical sounds. In this, its simplest form, it is probably the oldest of all musical instruments. Such is the P. of Gk. art and song and from it later varieties have been evolved, one being the bagpipes. In England the morris dance was accompanied by P. and tabor. The P. had three holes, two in front for the first two fingers and one at the back for the thumb; the player held the P. in the left hand and, with his right, beat the tabor suspended from his left wrist. All wind instruments, including the organ, are 'pipes.' They may be classified into reed (q.v.) Ps., such as the clarinet, oboe; whistle Ps., such as panpipes (see under ORGAN and also PANDEAN PIPES); and Ps. with cup mouth-pieces, such as the trumpet. Organ Ps. may be stopped, open, reed, or flute (see ORGAN).

Pipe (Tobacco). The tobacco P. was invented in America before the time of Columbus, specimens having been found in auct. Indian mounds. It was introduced into England by Sir Walter Raleigh in 1586, and was first regularly manufactured in London in 1619. Ps. are made of various materials, including pipe-clay (q.v.), meerschaum (q.v.), and briar-root. Briar-root Ps. now very common, have the bowl and stem made of one piece of wood, and although the stem is short, they partially absorb the oil produced in smoking. That Ps. for smoking herbs for medicinal and other purposes were in use in England and elsewhere long before the introduction of tobacco is tolerably certain. Coltsfoot, yarrow, mouse-ear, lettuce, and other plants were smoked in Ps. A primitive kind of P. consisted of a stick of elder, from which the pith had been removed,

with a bowl formed out of common clay and dried by the kitchen fire. Ps. have been found in situations near the Rom. wall in Northumberland and other Rom. stations in Britain. The names Danes' P., Celts' P., Elfin P., Fairy P., Old Man P., etc., are popularly given to some museum specimens, but afford no evidence as to their real antiquity. Many of them are remarkable for their very small size, whence, perhaps, some of the names, but this is easily accounted for by the consideration of the very high price of tobacco when first introduced into Europe. Stone Ps., or P.-bowls, have also been found in Britain, cut in rude forms, and which apparently were used by the insertion of a tube, perhaps a straw. Such P.-bowls, but elaborately carved, are amongst the most remarkable Amer. antiquities. They continue, however, to be made by the Amer. Indians, often of stone, and are adorned with figures of men and animals. Aubrey, writing in 1680, says that tobacco-smokers at first used silver Ps., but the ordinary sort made use of a walnut-shell and a straw. In the reign of William III. Ps. were occasionally made of brass and of iron. The P. was, in the earlier days of smoking, passed round the "ah! , om" man taking a whiff or two and then handing it to his neighbour as in the smoking of the P. of peace by the N. Amer. Indians. The barrel-shaped bowl was most usual during the Commonwealth and the reign of Charles II., although it was made in many various shapes, which are well known from representations of them in prints of the time and on traders' tokens. In the reign of William III. a more elongated form of bowl began to be prevalent, probably introduced from Holland. In the middle of the eighteenth century the wide-mouthed bowl, now so universal, became the prevalent form, and the spur which had hitherto been flat, to rest the P. upon when in use, was elongated, after a fashion supposed also to have originated in Holland. The Scottish *cutty* P. and Irish *dudeen* are short clay Ps. The most celebrated seat of clay P. manufact. in Britain is Broseley, in Shropshire, where it appears to have been estab. in the middle of the sixteenth century. Ps. are, however, made in many places, the clay being obtained chiefly in Cornwall. The P.-makers of London, as early as 1601, had privileges which gave them a monopoly. In 1619 the craft of P.-makers was incorporated in England. Holland has long been famous for P.-making. See W. Bragge, *A Catalogue of Pipes*, 1880, and A. Dunhill, *Pipe Book*, 1924.

Pipe-clay, white, friable clay used for making clay pipes. It is similar in many respects to the clay used in the manufact. of china, and consists mainly of kaolin, particles of quartz, and partly decomposed felspar, and is usually free from alkalis. The clay is found chiefly in Cornwall and Dorset, and is made into pipes at Amesbury in Wiltshire and at Broseley in Shropshire.

Pipefish, name for sev. elongated fish of the order Syngnathidae, with small gill

opening and no anterior dorsal or pelvic fin. The snout is prolonged into a tube, and the mouth is toothless. They are small marine fish, poor swimmers, and live near the coast in temperate and tropical regions. The eggs of some species are carried by the male in a brood pouch on the abdomen or the tail; in others they are embedded in the soft skin of the abdomen.

Pipe-line, line or conduit of pipe sometimes many hundreds of miles long, by which oil is conveyed from an oil region to a market or to reservoirs for refining; also a line for carrying compressed air, or water (for domestic, industrial, or fire-fighting purposes), or tn. gas, or natural gas, or sewage, etc., or a line for conveying power from a hydro-electric installation. Ps. for the transportation of oil over long distances are known as 'trunk' Ps. The possibilities of these have been realised for a long time, one of the earliest being that constructed in 1897 between Baku and Batum on the Black Sea, for the bulk transportation of kerosene. Many thousands of such lines have been laid, chiefly in the U.S.A., the great majority of which have been constructed for the transport of crude oil from the main field to the refineries. During the Second World War sev. were constructed to free tankers, for strategic reasons, to relieve the load on railways, etc. Two famous war-time lines were known as Big Inch and Little Inch, the former being 24 in. in diameter and over 1300 m. long, the latter 20 in. in diameter and over 1500 m. long. Big Inch and Little Inch have twenty-six and twenty-seven pumping stations respectively in their lengths, each requiring 4500 h.p. at full load for the former and 3750 h.p. for the latter. Nearly 485,000 tons of crude oil are required to fill the Big Inch line. In the case of Little Inch the line is used for sev. different grades of gasoline, kerosene, and light gas oil. No attempt is made to separate the products, which are just pumped consecutively into the line, in quantities to suit the point of delivery, and provided the linear speed of products passing through the line is kept above a certain pre-determined minimum, the degree of contamination is very small. Another interesting line was the 'Phuto' (Pipe Lines under the Ocean) system of cross-channel lines which were laid to maintain supplies of gasoline to the Allies during the invasion of Europe. For laying, the lines were wound on huge floating drums, shaped something like a cotton reel, being 40 ft. in diameter and 60 ft. long. Each was then towed by a tug, the drum resting on the water and paying out the line as it went. One of the most effective systems of Ps. is the Victaulic system of flexible Ps., and it would appear that even an unskilled man can build up, from standard Victaulic joints and fittin., and a few specialities, complicated pipe systems which otherwise might require 'specials' or tinplate pipes. In this connection an air line, over 1½ m. long, was laid by unskilled labour in the Toyo mines, near Tokyo, in

1931. The flexibility of this system allows a P. to be laid over a large curve upon the ground or over undulations, without the use of bends, and also permits the P. to lengthen considerably as it sags, thereby avoiding the heavy stresses which otherwise arise. A mile of line can lengthen by 36 in. (or more, according to diameter); assuming this mile to consist



New York Times Photos

OIL PIPE-LINE IN PENNSYLVANIA

of 20-ft. lengths the P. can sag 74 ft. in the middle before any undue stress comes on the joints or pipes. The Victaulic joint consists of two portions, the flexible inner ring and the metallic outer ring, or housing. The inner ring is an adaption to pipe-joints of the principle of the U washer which made modern hydraulic machinery possible. The internal pressure of the main acts on the interior flexible ring, forcing its edges against the tube with a pressure which automatically increases as the working pressure rises, thus preventing any leakage. The

housing positions the inner ring accurately in the tube ends, supporting it closely so as to relieve it of all bursting stress, and also couples the tube ends positively, while yet allowing a certain limited but valuable movement between them. Joints are now made to allow an angular movement at each joint, which varies from 5° on small to 1° on large pipes or a longitudinal movement of at least $\frac{1}{4}$ in. The longitudinal movement is the more valuable, providing as it does for expansion and contraction in mains laid above ground and for subsidence in buried mains. A change of shape in a P. invariably necessitates a change of length if severe local stresses are to be avoided, and a well-designed joint should provide for both movements under working conditions. Drop forged steel housings, made from good quality mild steel, have an ultimate tensile strength of 28 to 32 tons per square inch, but where exceptional stresses are to be withstood material of a higher tensile strength is used. The flexible rings are made from a special composition which does not oxidise or harden over long periods even in tropical climates. There are two qualities of rings—one for water or compressed air, the other for oil or gas. The material for both is essentially a rubber composition into which no oils or scrap or reclaimed rubber is used. The protection of Ps. against corrosion, especially buried lines, is of the utmost importance, and in the prices a coating of bitumen, a wrapping of asbestos felt, and a final application of bitumen. Nowadays an inhibitor is normally introduced into the P. to retard the formation of rust.

Piper, John (b. 1903), Brit. painter and writer, b. at Epsom, and educated at Epsom College and the Royal College of Art. His water-colours and striking aquatints of architectural subjects made him famous. During the Second World War he painted the ruins of the House of Commons, and in 1941-42 did a series of water-colours of Windsor Castle, at the request of H.M. the Queen. P. has also designed *décor*s and illustrated books. Pubs. include *Brighton Aquatints* (1939) and *British Romantic Painters* (1942).

Piperaceae, **Pepperworts**, natural order of shrubs or herbs with small flowers in spikes which are followed by somewhat fleshy fruits. Pepper and betel leaf are important products of *Piper*, a typical genus.

Piperidine, basic liquid (boiling point 106° C.) of the formula $C_4H_{11}N$. It is prepared by reducing pyridine (q.v.) with sodium and alcohol.

Piperine, alkaloid of the formula $C_{17}H_{19}O_2N$. It occurs in pepper, and was synthesised chemically in 1882. P. forms white crystals; melting point 128-5° C.

Pipe Roll, Great Roll of the Exchequer, now kept in the Record Office, London. The accounts of the revenue collected by the sheriffs are contained in it, and these were known as pipes. The first extant P. R. dates from the early twelfth century. P. Rs. contain valuable information on subjects connected with

national finance and revenue. See also PUBLIC RECORD OFFICE.

Pipettes, glass tubes drawn to a point at one end and usually provided with a bulb.



PIPETTE

They are graduated to deliver specified volumes of liquids. In order to fill a pipette the liquid is sucked up until it reaches above the graduation mark on the stem, and the finger is then placed on the upper end. By gradually releasing the pressure the level of the liquid is allowed to fall until coincident with the graduation mark. On emptying the pipette the last drops are either blown out or drained off against the side of the containing vessel.

Piping Crow, or **Australian Magpie** (*Gymnorhina*), genus, by some authorities classified as a sub-order of the family Corvidæ, comprising three species which occur only in the Australian region. Their plumage is black and white. They are

skillful mimics and can be taught to whistle tunes, hence the Australian name 'Flute Player.' Their diet is entirely of insects. *G. tibica* is common in New S. Wales, and is frequently kept as a pet.

Pipit (*Anthus*), genus of passerine birds characterised by a slender soberly coloured body and a notched and fairly long beak. The meadow P. or titlark (*A. pratensis*) is the commonest Brit. species. It is the chief victim of the cuckoo's habit of finding a foster-mother for its eggs. Other Brit. species are the tree P. (*A. trivialis*) and the rock P. (*A. obscurus*). The genus was formerly comprised in the genus *Alauda*, which includes the woodlark and skylark, but is now placed with the wagtails in a separate family, Motacillidæ.

Pippi de' Giannuzzi, see GIULIO ROMANO.

Pippin, see PEPIN.

Pipridæ, see MANAKINS.

Piqua, city of Miami co., Ohio, U.S.A., 26 m. N.W. of Dayton. Pop. 16,009.

Piqué, one of many forms of cotton fabric, used for making white dress shirts, shirt fronts, white waistcoats, and dress goods. Brit. worst fabrics are known as P., having distinct cords or welts running width-wise. Amor. corded or combed yarn fabrics are warp P.s. with narrow raised cords or welts running warp-wise. If there is a very narrow cord it is termed pin wale. Better qualities have additional coarser warp ends woven along back under each cord to help raise it. Fancy P.s. are compound fabrics with quilted or puffed designs, also known as vestings.

Piquet, long-established card game, in a sense the aristocrat of card games for two. Its polished technique and fr. termin-

ology bear witness to its courtly origin. It is played with a pack of thirty-two cards, all below the sevens being removed. The cards used rank in the whist order. The players out for deal. The player drawing the higher card (ace high) may, and should, elect to deal first; he is 'Younger Hand.' The non-dealer is 'Elder Hand.' Younger Hand must deal the cards out either by twos or threes until each has twelve. The remaining eight are called the stock. The object of the game formerly was to score 100 points before one's adversary, but since the introduction of the *Rubicon* game, no precise number of points constitutes a game; but the players play six deals or a 'partie,' the winner of the partie deducting the loser's score from his own, and adding 100. If, however, the loser fails to score 100, the winner adds the loser's score to his own prior to adding the 100. In this case the player who loses is said to be 'rubiconed,' i.e. has failed to cross the Rubicon. The scoring is by certain combinations, there being three possible scoring combinations, viz. (1) the *point*, i.e. the most of one suit; (2) the *sequence*, i.e. the greatest number of consecutive, not less than three, of the same suit, or, the *best* sequence if both players have an equal number; (3) the *quatorze* or *trio*, i.e. four aces, four kings, four queens, or four tens, or three of each. The *point* combination counts one for each card of the suit; if the players be equal, the scoring is by pips, the ace counting 11, the court cards 10 each. A *sequence* of three cards of any kind ('*tierce*') scores 3, of four cards ('*quart*') 4, beyond which 10 is added, e.g. five cards ('*quint*') score 15, six ('*sixième*') 16, and so on up to eight. Of two sequences the longer is always the better, e.g. knave, ten, nine, eight, are better than ace, king, and queen. As in *point*, if the best sequences are equal, neither player scores. A *quatorze* scores 14, and a *trio* 3; a *quatorze* of any kind necessarily destroys a *trio* of any kind. Each player after the deal has a right to reject some of his cards and take others from the 'talon' stock, Elder Hand (i.e. the non-dealer) having the right to begin. He must discard at least one, and may discard as many as five. The dealer in his turn must discard one, and may, if he choose, take all or any of those that remain. The actual play follows the ordinary rules of whist, i.e. the scoring is by tricks. Elder Hand begins the play, the dealer, prior to putting his card down, declaring his scoring combination. The scoring of the *play* is thus: the first player to every trick counts 1, but if the other wins the trick, the latter also counts 1, and the player who takes the last trick scores an extra 1 for it. A player who wins more than six tricks scores 10 'for the cards'; if both win six tricks there is no score 'for the cards' on either side. Additional scores for extra ordinary cases are: (1) *Carte blanche*, when a player who is dealt a hand without king, queen, or knave may claim 10; (2) *Repique*, when a player who scores 30 in hand where his opponent has not scored at all, 60 extra; (3) P., when

Elder Hand scores 30 extra, having scored 30 in hand and play where Younger Hand has nothing to declare and has not claimed equality in point of sequence; and (4) *Capot*, when a player winning all twelve tricks scores 40 instead of 10 for the cards.

Piracy. In its essentials P. by international law (*q.v.*) does not differ from P. according to the municipal law of any individual civilised nation. Writers on international law define P. as consisting in depredations on the seas not authorised by any sovereign state, and differentiate 'acts of hostility' from piratical acts. Where nations are at war with each other, robbery or other depredations committed by subjects of one warring nation against or on those of its enemy would be merely hostile acts; but if the person injured and the person inflicting the injury are either subjects of nations at peace with each other or of one and the same state, the injury amounts to P., and is recognised by all civilised nations as an act punishable by the courts and under the laws of the injured person's state. In short the essence of P. is 'the pursuit of private as contrasted with public ends,' and a pirate or sea-rover is primarily 'a man who satisfies his personal greed or his personal vengeance by robbery or murder in places beyond the jurisdiction of a state.' By the Eng. common law, P. is taken to include all those acts of robbery and depredation upon the high seas which, if committed upon land, would be classified as felonies (*see CRIMINAL LAW*). But a number of other acts, really amplifications of the underlying principle of P. *jure gentium*, have been made P. by various statutes passed in 1670, 1698, 1717, 1721, and 1744. Statutory P. includes, *inter alia*, the following acts: The voluntary cession by a commander, master, or seaman of his ship or cargo to a pirate; rendering assistance to a pirate; the running away by a commander, master, or seaman with a ship or cargo; boarding a merchantman and destroying the cargo; the rendering assistance to the enemy on the sea by a natural-born Brit. subject, or the commission by such a person against another Brit. subject of an act of hostility under the pretext of a commission from a foreign power; and generally having dealings with a pirate. The punishment was formerly death, but is now penal servitude to the extent of life or imprisonment not exceeding three years. But capital punishment would still be inflicted for P. accompanied with either an assault with intent to murder or with any act endangering life. Notable pirates of the past were the Corsairs (*q.v.*) of N. Africa, and the successors of the buccaneers (*q.v.*) on the Sp. Main (*see also* KIDNAP, WILLIAM). Except perhaps in Chinese waters, P. is practically unknown in modern times.

Piræus (*Πειραιεύς*), Porto Leone, or Draco, tn. of Attica, Greece, the seaport of Athens since about 485 B.C., an important port and harbour both in ant. and modern times. Themistocles recognised its superiority to Phalerum and persuaded his countrymen to fortify it after the Persian wars, and connect it with Athens (about

5 m. N.W.) by the famous 'Long Walls.' Cimon and Pericles in the fifth century B.C. carried out the plan of Themistocles. It had three harbours, the largest being W. of the peninsula on which the tn. stood, and was the abode chiefly of the democratic Athenian pop. and of foreigners. Munychia to the S. was the Acropolis of the P., on a hill now called *Καστελλάκι*. The fortifications were destroyed (404 B.C.) after the Peloponnesian war, but restored in 393. Sulla destroyed them again (86 B.C.), and from that time the tn. sank into obscurity until 1834. It was then rebuilt with arsenal depots and a naval and military school. A railway was constructed (1869) connecting it with Athens. It is the chief port of entry for imports, locally known as 'the Manchester of Greece,' and is the second largest city in Greece. Marble from the quarries of Pentellicus, Skyros, and Tinos, olives, and oil are exported. Cottons, silk, paper, machinery, iron, macaroni, and flour are manufactured, and there are tanneries, distilleries, and shipbuilding yards. Coal, railway plant, petroleum, and cattle are among the chief imports. In the Second World War it was bombed by It. aircraft (Jan. 1941) and later, when in Ger. occupation, Brit. aircraft bombed its military installations. Pop. 210,800. *See further under* ATHENS. *See* W. M. Leake, *Topography of Athens*, 1841.

Piran (Kiran), St., *see* PIRANZABULON.

Pirandello, Luigi, (1867-1936), It. novelist and playwright, b. at Girgenti, Sicily. He was educated at the univ. of Rome and afterwards at the univ. of Bonn. His first book, *Mal Gioconda* (poems), appeared in 1889, and during the next thirty years he produced novels and short stories, numbering some four hundred. Of his novels, *I fu Mattia Pascal* (1904) had an originality which influenced It. fiction in the reaction against the romanticism of D'Annunzio. In 1910 P. began writing for the stage, turning many of his short stories into plays. It is as a dramatist that he earned a European reputation, both for the technical brilliance and originality of his method and for his metaphysical choice of subject. His recurrent theme was the dislocation of the personality under the stress of circumstances, showing that character is not an absolute quality, but fluctuates between its inherited tendencies on the one side and the conditions of society on the other. His best-known plays are *Sei Personaggi in Cerca d'Autore* (or 'Six Characters in Search of an Author') (1921); *Enrico Quarto* (1922); and *Ciascuno a Suo Modo* (1924). Besides plays and stories he has written *L'umorismo* (1908), a study in humour. With literature P. combined the profession of teaching, and was a prof. at the Istituto Superiore di Magistero Femminile, a higher training school for women in Rome. P. was awarded the Nobel prize for literature in 1934. Eng. trans.—*Sicilian Limes* (1921); three plays: *Six Characters in Search of an Author*, *Henry IV.*, and *Right You Are* (1922); *Each in His Own Way*, and two other plays (*The Pleasure*

of *Honesty and Naked* (1923); *The Late Madita Pascal* (1923); *The Outcast* (1925); *Shoot! The Notebooks of Serafino Gubbio*, Cinematograph Operator (1927); *Horse in the Moon* (1932). See also W. Starkie, *Luigi Pirandello*, 1926, and *Luigi Pirandello and the Italian Drama*, 1937; F. Pasini, *Luigi Pirandello*, 1927; life by F. Pasini, 1927; and D. Vittorini, *The Drama of Luigi Pirandello*, 1935.

Piranesi, Giovanni Battista (1720-78), It. engraver, b. at Venice, and studied at Rome. He afterwards led a wandering life, and spent his time in architectural designs, in which branch of his art he excelled, his work being characterised by its freedom. The number of his designs is considerably over 1000. He also executed the repairs of and restored some churches under the orders of Clement XIII. See A. Samuel, *Piranesi: a Critical Study of His Life and Works*, 1910, and life by H. Focillon, 1928.

Pirano, tn. of Trieste ter., on a peninsula, 13 m. S.W. of Trieste. It exports considerable quantities of salt, and also olives and wine. Pop. 13,500.

Pirene (Pelrene), Fons, fountain of Corinth, Greece, whose waters apparently rose in the Acrocorinthus (citadel), connected with four rivers of the same name at the foot of the Acrocorinthus and on the road from the Agora to Lechaum (see Pausanias, ii. 3-5; Strabo, viii., p. 379; W. M. Leake, *Morea*, iii.). It was supposed to have gushed forth at the stroke of Pegasus's hoof.

Pirrenne, Henri (1862-1935), Belgian historian, b. at Verviers. After having studied at the univs. of Liège, Paris, Leipzig, and Berlin he lectured at Liège in 1885 and was prof. at the univ. of Ghent from 1886 to 1930. He specialised in the hist. of the Middle Ages, and of particular interest are his works on the historical growth of the cities and their first economical and social aspects: *Histoire de la ville de Dinant au moyen âge* (1889); *Les Anciennes Démocraties des Pays-Bas* (1910); *Étapes de l'histoire sociale du capitalisme* (1911); *Les Villes au moyen âge* (1927). His main work, however, is a monumental *Histoire de Belgique* (7 vols., 1900-32) in which predominates his thesis that Belgium as a nation has had a vital place in the hist. of W. Europe. Other chief works are *Bibliographie à l'histoire de Belgique* (3rd ed., 1931); *De la méthode comparative en histoire* (1923); *La Belgique et la guerre mondiale* (1928); *Histoire de l'Europe des invasions au XVI^e siècle* (1936). From March 1916 to Nov. 1918 he was imprisoned as a hostage in Germany.

Pirke Abuth (i.e. Sayings of the Fathers), one of the treatises of the Jewish *Talmud*, a collection of representative sayings of anc. rabbis in the manner of the book of Ecclesiastical.

Pirmasens, tn. in Bavaria, 44 m. S.W. of Mannheim. It is engaged chiefly in the manuf. of boots, shoes, and musical instruments. Pop. 43,000.

Pirna, tn. in Saxony, Germany, 11 m. S.E. of Dresden. Its chief manufs. are pottery, enamelled ware, and glass ware.

Tanning is also carried on. It was the scene of the surrender of the Saxons to the Prussians in 1756. Pop. 31,000.

Pirot, tn. and the cap. of the prov. of Pirot, 36 m. S.E. of Nish, Yugoslavia. It was the scene of the Serbian defeat of 1885. Its pure wool carpets are dyed by local dyers with natural colours, both the dyeing and colour mixing being secret processes known only to the carpet-makers of P. Pop. 13,000.

Pir-Panjaj, range of mts. bounding Kashmir on the S.W., and rising to a height of 15,000 ft.

Pisa: 1. Prov. of Tuscany, Italy, bordering the gulf of Genoa and the Tyrrhenian Sea, bounded E. by Florence and Siena, W. by Livorno (Leghorn) and the sea. Fertile in the W., hilly and mountainous S. and E., it is watered by the Arno and the Serchio. Wine, oil, and wheat are produced. Manufs. include silks, cottons, linens, glass, pottery, candles, and soap. Marble is quarried, and coal and copper are mined. Area about 1179 sq. m. Pop. 351,000. 2. Cap. of above, and of Tuscany, on the Arno, 12 m. from Leghorn. It is an archbishop's see. Once the rival of Genoa and Venice, its commerce has been transferred to Leghorn, and the pop. has declined considerably from the sixteenth century, the only large manuf. now being cottons. Its magnificent buildings remain, including the Piazza del Duomo (N.), containing the marble Gothic cathedral (1063-1118), with its fine dome and façade, bronze doors, and pulpit by Niccolò Pisano, founder of the Pisan school of sculpture; the Campanile or 'Leaning Tower' (about 180 ft. high, deviating about 16 ft. from the perpendicular), built between 1174 and 1350 with eight storeys; the Campo Santo or cemetery (thirteenth century); and the baptistery (1153-1278), with its conical dome. Other famous buildings are the univ. (about 1338), with its library and museum, and the circular church of St. John. The Bagni di P. (medicinal springs) are 3½ m. N. Called Julia Pisana by Livy, P. was subject to Rome in the fifth century, but was a powerful and independent republic by about 1000. The Pisans were crushed off Meloria by the Genoese (1284). The Milaneses took the city (1399), and sold it to Florence (1405). A short-lived republic under Fr. protection was overthrown by the Florentines (1509). P. was incorporated with Italy (1860), and suffered severely in the Second World War. The damage to the Campo Santo was a major disaster to world art, as much of it was irreparable. The Ponte de Mezzo was damaged and all the other bridges were blown up. Pop. 76,800. See J. Schubring, *Pisa*, 1902; Janet Ross and Nellie Erichsen, *The Story of Pisa and Lucca* (Medieval Towns Series), 1902; and J. de Foville, *Pise et Lucques*, 1914. (See illustration, p. 560.)

Pisagua, tn. in the prov. of Tarapaca, Chile, 45 m. N. of Iquique. It is chiefly engaged in the shipping of nitrate of soda. Pop. 1500.

Pisan, Christine de, see CHRISTINE.

Pisano, Andrea (c. 1270-1349), It.

sculptor, whose real name was Andrea de Pontedera, *b* at Pontedera a pupil of Giovanni P. He settled in Florence and became famous as a worker in bronze and marble. P. executed the door of the baptistery in Florence and the bas-reliefs designed by Giotto for the lower storey of the campanile.

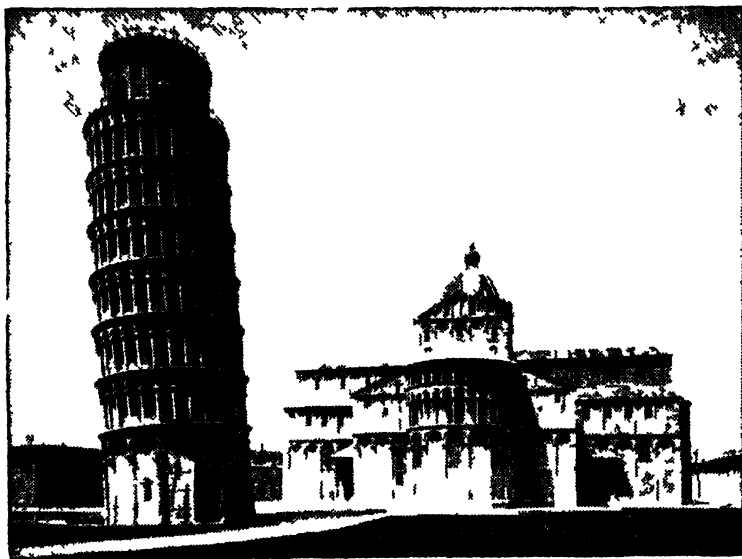
Pisano, Giovanni (1240-1328), Italian sculptor and architect, son of Niccolò P., *b* probably at Pisa. He worked with his father on the pulpit of Siena, and built the famous Campo Santo at Pisa and the

Pisanus, see LEONARDO OF PISA.

Pisaurum, see PESARO.

Piscataqua, riv. formed by the Salmon and Cocheco R., and part of the boundary between New Hampshire and Maine, U.S.A. At its mouth is the harbour of Portsmouth.

Pisces (the fishes'), twelfth and last sign of the Zodiac. It is a large constellation, bounded on the E. by Aries and Triangulum, on the W. by Aquarius and Pegasus, on the N. by Andromeda, and on the S. by Cetus. Its constellation consists



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shrine of San Donato at Arezzo. See M. Sauerlandt *Über die Bildwerke des Giovanni Pisano* 1911.

Pisano, Niccolò (1170-78). Italian sculptor and architect, *b* at Pisa. He built the Santa Trinita at Florence, Santa Margherita at Cortona, pulpit of the baptistery at Cortona, pulpit of the cathedral at Siena, etc. See A. Schmarow *Italianische Kunst im Zeitalter Dant's* 1928.

Pisano, Vittore, called Pisanello (c. 1400-1456). Italian painter and greatest of Italian medallists, *b* at San Vigilio. His horses and other animals were especially fine. The London National Gallery has a panel by P. of St. Anthony and St. George with a vision of the Virgin and Child, but he is chiefly remembered for his medals. He worked on medals for the court of Mantua (1439), and executed portraits of many of the princes of his time, including Leonello d'Este (1444). See G. F. Hill *Pisanello* 1905.

of two fishes linked by a string attached to their tails. One is under the right arm of Andromeda, the other under the wing of Pegasus. It is *Astrubus* or *Pisces Austrinus*, a constellation situated S. of Aquarius, contains Coma but a remarkable star of the first magnitude and *Pisces Volans* now *Volans* (the flying fish) is one of Boreas S., constellations lying W. of Coma (q.v.).

Pisciculture, artificial breeding and rearing of fish for food and sport. The Egyptians, Greeks and Romans practised P. to the extent of fattening edible fishes in specially constructed ponds. They may have been familiar with the art of breeding fish artificially, but the knowledge was lost, if it existed, until rediscovered by a monk in the fifteenth century, who learnt how to hatch and rear trout in boxes in a running stream. Further discoveries in the middle of the eighteenth century caused great interest in the subject, but

not till a century later were the practical possibilities much realised and applied. Most fish produce ova in enormous numbers, but the proportion of young that in nature reach maturity is very small owing to the great delicacy of the ova and young fish, and also to their numerous enemies. It is the object of *P.* substantially to diminish this mortality, beginning with the shedding and impregnation of the ova, at any rate in the culture of the Salmonidae. Males and females are, when 'ripe,' placed in separate tanks through which water is running. A few females are caught in a landing net and one by one taken into the operator's hands and the ova expressed into a clean dry basin. When the artificial spawning is completed, a male is taken and the milt expressed into the basin amongst the eggs and then stirred by hand. A little water is added, and after about thirty min. the eggs are removed to the hatching boxes. Water which has passed through a filter-box containing three layers of gravel is run over the eggs to a depth of about 2 in. The trays are covered to exclude light in a temp. between 40° and 50° F. Incubation takes from forty days to three months, according to temp. and other conditions. The ova stand handling for the first day, and then must be undisturbed until the eyes are visible, when they may be packed and transmitted long distances. The young that emerge from the eggs are called alevins. Each has attached to it a large transparent umbilical sac, which contains the nourishment necessary for thirty or forty days. At the end of this period they begin to look for food, which, naturally, consists of minute crustacea, but is artificially supplemented by grated liver and other meat. During this stage, the most difficult period in *P.*, the water entering the hatchery is no longer filtered; in fact, every effort is made to provide water which contains an abundance of suitable food. Later they are removed to ponds, and in a well-managed hatchery from 50 to 80 per cent reach the yearling stage, after which losses are normally small. In coarse fish culture spawning is allowed to be done naturally, and the eggs hatch much more quickly, but require warmer water. Adequate protection of the ova and young is the chief factor in providing large numbers of these fish. Marine *P.* has in recent times received much attention, particularly in the U.S.A. See C. B. Hall, *Ponds and Fish Culture*.

Piscina (Lat., fish-pond, swimming-tank), originally a pond, tank, or cistern of any kind. In eccles. usage a small sink or perforated stone basin (fr. *cuvette*) in a niche S. of the altar, at which the water used for rinsing the priest's hands, the chalice, and other vessels is poured away after the celebration of Mass. They were rare in England till the thirteenth century.

Pisco, port of N. Peru, in the dept. of Ica, 130 m. S. of Callao and Lima. It is on the Pan-Am. Highway and is an outlet for agric. products. P. Pueblo remains an old-world Sp. colonial tn.;

P. Plaza is modern and industrial, and exports cotton, grapes, and wine from the Ica, P., and Chincha valleys. Pop. 5000.

Pisek, tn. in Bohemia, Czechoslovakia, cap. of a dist. of the same name, 28 m. N.N.W. of Budějovice. It has iron and copper foundries, and there are manufs. of wool, cotton, and musical instruments. Pop. 17,000.

Pisgah ('boundary') (modern Rās Siāghah), O.T. name of a mt. peak of Syria, Palestine, 2 m. from Jebel Neba (Mt. Nebo of the O.T.), 6 m. from Hesban (anct. *Heshbon*), E. of the N. extremity of the Dead Sea. It formed part of the range of Abarim (*q.v.*). See Num. xxi. 20, xxiii. 14; Deut. xiii. 49, xxxiv. 1.

Pishin, dist. of Baluchistan, Pakistan. Until 1878 it was part of S. Afghanistan; in that year it was ceded to Britain and remained in Brit. hands until the transfer of power in 1947. Area 2720 sq. m. Pop. 75,000.

Pishpek, see FRUNZ.

Pisidia, inland dist. of Asia Minor, lying N. of Lycia and Pamphylia. It was a mountainous region inhabited by a warlike people, who maintained their independence against the successive rulers of Asia Minor in anct. times.

Pisistratides (Πεισιστρατιδαι), name generally applied to Hippias and Hipparchus, sons of Pisistratus, but sometimes extended to mean the grandchildren, descendants, and near connections of Pisistratus (see Herod. viii. 52). Hippas succeeded his father, but Hipparchus apparently had some share in the government (see Thuc. i. 54-59). It was the latter who set up the busts of Hermes as milestones on the high roads. The conspiracy of Harmodius and Aristogeiton to eject these 'tyrants' is well known. Their plan miscarried, and only Hipparchus was slain, while they themselves lost their lives. Hippas was expelled a few years later, and finally fled to the Persian court, witnessing the defeat of the Persians at Marathon (490 B.C.). See HARMODIUS and ARISTOTELIS.

Pisistratus (Πεισιστρατος), famous Athenian statesman (c. 612-527 B.C.). 'Tyrant' of Athens three times between 561 and 527. He was the son of Hippocrates, of Pylion descent, and a relative and friend of Solon. After the estab. of Solon's constitution disturbances broke out between the rival parties of the plain, the highlands (Diacrii), and the coast, Lycurgus, P., and Megacles the Alcmaeonid heading the three respectively. P.'s military abilities were displayed in the war with the Megarians and the campaign against Salamis (565). Having pretended that he had been attacked by his foes, P. had a bodyguard granted him, and, after increasing its number, was strong enough to seize the Acropolis (560). He was exiled (c. 554) by the combined forces of the plain and the coast factions, but quarrels then arose between these two and Megacles helped to restore P. (550). He was soon exiled again, but finally returned (540-39). His despotism was mainly of a mild kind and beneficial to the state. He ensured the election of members of his own family to high offices, such

as the archonship, but upheld Solon's democratic laws. He built fine temples, including those of the Pythian Apollo and of Olympian Zeus (the latter being completed by Hadrian), and was a patron of literature. The first collection of Homer's poems was said to be due to him. He probably also instituted the Greater Panathenaea. See Herodotus, i., v., vi.; Thucydides, iii.; Aristotle, *Ath. Pol.*, 13-16; Plutarch, *Solon*, 29-31; Moralia, 763, 805; Pansanias, 1-14; C. T. Seltman, *Athens*, 1924; and P. N. Ure, *Origins of Tyranny*, 1922.

Pisolite, see OOLITE.

Pissarro, Camille (1830-1903). Fr. painter, b. in Normandy. He was influenced by Corot and Millet, becoming one of the most notable of the Impressionist school, and establishing a close friendship with Monet. His landscape paintings were his finest work. See life by J. Rewald, 1946.

Pissarro, Lucien (1863-1944). Fr. artist, painter, and wood-engraver, b. in Osny near Pontoise, son of Camille P. (q.v.). Under his father's influence he began to draw at an early age. He went to work in Paris for a firm of Engr. fabric merchants, but was unfitted for such a life, and took a job working with hand-made plates for colour impressions. At the age of twenty in 1882 he left France and settled in London. At first he was employed with musical publishers, and continued to draw and paint. He lived with Phineas Isaacson, his uncle, whose wife was a half-sister of his father's. Then he took a studio and devoted himself to giving drawing lessons and to wood-engraving. Later he set up the Eragry Press (Eragry was the name of the vil. where his father was born) and produced finely printed vols. illustrated with his own woodcuts or engravings. In his art P. was a neo-impressionist, and with Sickert, Wilson Steer, and others helped to introduce Fr. Impressionism to London. He was also in touch with W. Morris and the Kelmscott Press. He blended the Fr. science of colour with an Eng. sense of design and was notable for his feeling for the Eng. countryside.

Pistacia, genus of small trees (family Anacardaceae) with pinnate leaves and panicles or racemes of small dioecious green flowers, some of which have yellow anthers and crimson stigmas. *P. vera*, the pistachio-nut tree, bears small oval nuts containing a green kernel, much used in India and elsewhere in confectionery, and also in pharmacy as a restorative. *P. lentiscus* is the mastic tree, yielding the mastic of commerce. *P. terebinthus*, the turpentine tree, yields Chian or Cyprus turpentine, which exudes from incisions made in the trunk. The trees are sometimes grown out of doors in favoured dists., but even there need protection in cold weather.

Pisti, see under BOTANY; FLOWERS.

Pistola, or **Pistola** (anct. *Pistoria*), walled tn. and episcopal see of the prov. of P. Italy, near the Ombrone, on a spur of the Apennines, 20 m. N.W. of Florence. Its twelfth-century cathedral has a fine

silver altar. P. contains also a natural hist. museum, an academy, public libraries, the Palazzo Pretorio (1367), the Ospedale del Ceppo (1277), and the Palazzo del Comune (1294). The chief manufs. are gun-barrels, firearms, and pistols, which are said to have derived their name from this tn., where they were first made. Cottons, woollens, silk twist, iron and steel goods, glass, leather, wine-flasks, paper, and musical instruments are also manufactured. Rock-crystals, called the diamonds of P., are cut. It has a good climate and is a favourite summer resort. Catiline perished in battle here (62 B.C.). P. was important in the Middle Ages, and suffered from the fends of the Neri and Bianchi (1296-1301). It came under the rule of Florence (1352). In the Second World War sev. of the noted churches of P. were destroyed or damaged. Pop. 74,000.

Pistol. The word is of unknown origin. The weapon is one development of the early hand-gun, heavier (infantry) models of which were fired from the shoulder with the help of a crutch on which the barrel rested. Lighter hand-guns, known as petronels, were made for the use of cavalry who could only use one hand for fighting. The petronel also rested on a crutch which rose from the pommel of the saddle; it had a straight horizontal butt, the end of which was pressed into a boss in the centre of the rider's breastplate with his free hand. From this evolved the pistol, primarily, and for centuries, a horseman's weapon. Ps. formed the prin. armament of dragoons (q.v.) who carried a pair in holsters on either side of the saddle. These horse-pistols were of heavy calibre and sometimes double-barrelled. Only its great weight and bulk prevented the multi-barrelled P. with six barrels mounted round a central axis from being developed further. Examples are extant from the reign of Henry VIII. of this arm, the ancestor of the revolver (q.v.).

Automatic Pistols have the advantage of being less bulky and more easily and quickly loaded than revolvers which they have largely replaced for military purposes. But their more complex mechanism renders them more likely to jam. A magazine of six or eight rimless cartridges is slid into the butt from below and the rounds are pressed upwards by a spring. The barrel and chamber are likewise held forward in the barrel-casing by pressure of a spring, so that the first round must be loaded and the pistol cocked by pulling the barrel backwards. When the first round is fired the recoil drives the barrel backward, the second round is automatically forced up into the breech, and the spent round ejected. Well-known military makes are Mauser, Colt, Browning, Luger, Walther, and Beretta.

Pistole, name given to certain gold coins, formerly current in Spain, Italy, and sev. parts of Germany, but now obsolete. It was first used in Spain, and was then equivalent to about eleven old Fr. livres. From 1728 to 1772 it was

worth 17s. 1d. sterling, but it gradually decreased in value and was finally withdrawn.

Piston, see under GAS ENGINES; STEAM ENGINES.

Pitaka, diva. in the Pan Scriptures (q.v.), which consist of three Pa., baskets, or collections. The first, *Vinaya P.*, deals with discipline and the *Mahavagga* (a hist. of the founding of the order); the second, *Sutta P.*, or collection of teachings, contains poems, fables, stories of Gautama, or Buddha, and about Buddhist saints, etc.; the third, the *Abidhamma*, contains speculations and discussions on various subjects.

Pitcairne, Archibald (1652-1713), Scottish physician and poet, b. at Edinburgh. He studied divinity and afterwards law at the univ. there and then medicine in Paris, whence returning to his native city he obtained a very extensive practice. He held the professorship of medicine at Leyden for a year, and during that time the celebrated Boerhaave was among his pupils. P. was the author of *Dissertationes medicæ* (1701). He also ridiculed the prevalent Puritanism, the satire on Presbyterianism, *Babel* (1830), being considered his work. He also wrote the comedy *The Ass, the Hy, or Scotch Reformation* (1722, 1752). See C. Webster, *An Account of the Life and Writings of the celebrated Dr. Archibald Pitcairne*, 1781.

Pitcairnia, genus of perennial herbs and shrubs (family Bromeliaceæ) from tropical America. Some species bear flowers in racemes of great beauty, and narrow or sword-shaped leaves which often have spiny margins. All the cultivated species are easily grown in the stovehouse in well-drained pots. They must be freely watered while making growth.

Pitcairn Island, is. in the Pacific Ocean, nearly equidistant from Australia and America, 25° 3' S. lat., 130° 8' long. It is a Brit. colony and, actually, the first Brit.-acquired land in the S. Seas. It has an area of 2 sq. m. Its length is about 2½ m., its breadth 1 m., and the coast is very rocky and inaccessible in most parts. P. I. has a fine climate; the soil is generally fertile, producing coconuts, bananas, breadfruit, yams, pineapples, tomatoes, etc. Oranges and pineapples are exported. It was discovered by Capt. Carteret in his sloop *Swallow* (1767) who named it Pitcairn after the midshipman who sighted it. After his return to England Carteret pub. an account of the *Swallow's* voyage; and there was a copy of the book in His Majesty's Armed Vessel *Bounty* when she sailed from Spithead in 1788. The is. remained unoccupied until 1790, when it was occupied by the mutineers of the *Bounty*, under Fletcher Christian, first officer and leader of the mutineers, with some women from Otaheite (see *BOUNTY, MUTINY OF THE*). Christian and his fellow-refugees destroyed the *Bounty* so as to sever all links with the outside world. For eighteen years they remained undisturbed, when, in 1808, an Amer. vessel, *Topaz*, called at P. I. not knowing what land it was, on the chance of seals and fresh water; and her crew, to

their astonishment, found that they had stumbled on the solution of the mystery of the *Bounty's* mutineers. The Amer. ship found that only one white man, John Adams, an able seaman of the *Bounty* was left. He had trained the children of P. I. with the help of a Bible and a prayer book brought ashore from the *Bounty*. No regular gov. was estab., but assistance of some kind was given on the subsequent visits of Brit. vessels. Later the Pitcairners so thrived and multiplied on their small but fertile is. that they were threatened with over-pop., and in 1831 they were removed to Tahiti. But the land of their maternal forbears proved uncongenial, and in the following year all returned to P. I. By this time the is. was being increasingly visited by whalers, followed before long by passenger ships for fresh vegetables. In 1856 the pop. numbering 192 were, at their own request, shipped to Norfolk Is. (where the youngest member of the party brought from P. I. actually survived until 1943). Forty of the party, however, soon returned, and at the beginning of the twentieth century the pop. numbered nearly 200 and in 1936, it was 202. But in 1949 this figure had fallen to 125, owing to the emigration of numbers of young people to Australia and New Zealand. P. I. was brought within the jurisdiction of the high commissioner for the W. Pacific in 1898, and in 1902 there were annexed to it the is. of Henderson, Ducie, and Oeno, occasionally visited by the Pitcairners for the collection of wood and other purposes. The Pitcairners elect their chief magistrate and is. Council annually by popular vote of all the islanders over eighteen. The latest revision of the regulations for the internal gov. of the is. was passed by a general assembly of all the native-born inhab. in 1940. Educational facilities exist but there are no medical services or any regular steamer service between New Zealand and P. I. The Pitcairners were given proof of the interest of Great Britain in their affairs by the visit of H.R.H. the duchess of Gloucester, in 1947. In 1949 the original P. I. Bible was returned to P. I. by the Connecticut Historical Society, the islanders being now all Seventh Day Adventists. See H. L. Shapiro, *The Heritage of the Bounty*, 1936, and Sir H. C. Luke, *The British Pacific Islands*, 1943.

Pitch, complex mixture of hydrocarbons, which is obtained as a residue from the distillation of coal-tar. It is also found naturally in lakes in Trinidad. At ordinary temps. it is a black substance, breaking with a conchoidal fracture, but on heating it forms a viscous fluid, which is used for caulking the decks of ships, in the preparation of varnishes, for cementing wood and metal work, for making asphalt (q.v.) and patent fuel, etc.

Pitch. The exact height (or depth) of any musical sound according to the number of vibration that produces it; also the standard by which notes, with the A above middle C as a starting-point, are to be tuned, a standard which determines at how many vibrations to the second that A

is to be taken, as well as every other note in relation to it. P. varied at different times and in different countries. Early in the nineteenth century it was gradually raised, especially by makers of wind instruments, to secure more brilliant effect, but with results dangerous to singers, and in England two Ps. were in use, the higher for orchestral performances and the lower classical or Fr. P. for church and purely vocal music. The new philharmonic P., with 439 vibrations per second at 68° F., is now in general use, even by military bands, which until 1927 used the old philharmonic P., which was slightly higher. The internationally agreed standard of P. is broadcast by the B.B.C. as the Third Programme tuning signal. It has a frequency of 440 cycles per sec. and corresponds to the note A in the treble clef.

Pitch, in engineering, distance between two successive windings of a screw measured in a direction parallel to the axis of the screw. The P. of gear-wheels is known as *circular P.*, i.e. the length of that part of the P. circle between the centres of two consecutive teeth. P. circle being an imaginary circle on a gear-wheel along which the *circular P.* is measured. The diameter of a gear-wheel is always the P. circle diameter unless otherwise stated. For variable P. in airscrews see AEROPLANES, *Structural Development*.

Pitchblende, or **Uraninite**, uranate of uranyl, $U(VO_4)_2$, generally occurring massive or botryoidal. It is a brownish or black solid with a greasy lustre (h. 5.5; sp. gr. 6.4-9.7), and when crystalline it forms cubic crystals. At Joachimsthal, Bohemia, uranate of soda is manufactured from it. Its chief value is for the uranium (q.v.) and radium contained, and it is obtained for this purpose from Cornwall, where it is associated with tin ores, from Saxony (Marienberg), Bohemia, and Norway (Kongsberg).

Pitcher Plant (*Nepenthes*), large genus and family (Nepenthaceae) of insectivorous shrubs found in E. tropical forests, with alternate leaves and midrib enlarged into a pitcher-shaped receptacle with a partly opened lid. The thick corrugated mouths of the pitcher produce sweet secretions which attract insects. These collect within and are digested by other glandular secretions. The Californian P. P., *Darlingtonia californica*, bears leaves in the form of erect trumpet-shaped tubes with a swollen hood at the top, in which is the opening to the pitcher. In the E. U.S.A. the side-saddle plant, *Sarracenia*, also bears insectivorous pitchers.

Pitch Lake, see under **PITCH**.

Pitchstone, name given to glassy rocks, which are characterised by a resinous lustre. Such rocks have a microcrystalline gravel mass, peculiar groupings of microlites (q.v.) being observable in microscopic sections. The crystallites contained are generally of ferro-magnesian minerals. Ps. break with a splintery fracture, are black or dark green in colour, and are found as intrusive dykes (Arran) and as contemporaneous sheets (Sculr of Elgg).

Pitești, cap. of the prov. of Argeș, Rumania, 70 m. W.N.W. of Bucharest on the R. Argeș. Pop. 15,700.

Pithecanthropus erectus, remains of a man-like skeleton found (1891) by Eugène Dubois in some volcanic tufts of probable Pleistocene age, near Trinil, Java. The relics discovered were the roof of a skull, two molar teeth, and a femur, the abnormal form of which indicated that its possessor walked erect. The forehead was low, frontal ridge prominent, and brain capacity two-thirds that of the average man. The characteristics, in general, indicated a type between man and his more remote ancestry, which is supposedly not similar but an independent phylum. The name P. is from Gk. *pithekos*, ape, and *anthropos*, man. See also ANTHROPOLOGY; MAN.

Pithiviers, cap. of dept. of Loiret, France, 25 m. N.E. of Orleans. Saffron is grown, and it is famous for its cakes and honey. Pop. 6000.

Piti, see under GUAM.

Pitlochry, tn. in W. Perthshire, Scotland, on the R. Garry, 6 m. S.E. of Blair Athol, between Perth and Inverness, amidst picturesque scenery. P. is a health resort with hotels. There are important distilleries, and tweed-making is carried on. Pop. 2200.

Pitman, Sir Isaac (1813-97), inventor of the system of shorthand known by his name, b. at Trowbridge, Wiltshire. While teaching as a schoolmaster at Wotton-under-Edge, he pub. his *Stenographic Sound Hand*, and later gave himself up entirely to the work of spreading the system there propounded. In 1842 he commenced the *Phonetic Journal*, which he carried on until his death. P. was a strong supporter of spelling reform. He founded the publishing house which bears his name, and pub. books on shorthand and commercial and technical subjects. He was knighted in 1894. See lives by T. A. Reed, 1890, and A. Baker, 1908. See also SHORTHAND.

Pitomaea, com. in Yugoslavia, 3 m. from the l. b. of the Drave, and 50 m. from Varasd. Pop. 3000.

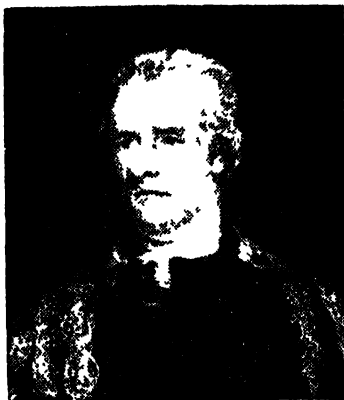
Pitot Tube, instrument designed to measure high velocities of running water, such as rivers. It consists essentially of an L-shaped glass tube, the horizontal arm being placed under the water, and a graduated scale to note how high the water rises in the vertical arm of the tube through the force of the stream. The velocity is found from the formula $V = c\sqrt{2gH}$, where H = height of water in the tube in feet, $g = 32.2$, c = a constant depending on the type of tube, and V = the velocity of the water in feet per second. For pressure tube see under MANOMETER.

Pitri (Sanskrit *pitṛ*, father), in anct. Hindu mythology, a class of divine beings who dwell in celestial regions and received into their company the souls of the righteous dead. Later, they were divided into two classes, the original divine beings and the manes of deceased ancestors, who became semi-divine.

Pittscottie, Robert Lindsay of, see LINDSAY.

Pitt, William, the Elder, see CHATHAM, EARL OF.

Pitt, William, the Younger (1759-1806), Brit. statesman, b. at Hayes, Kent, was the younger son of Wm., first earl of Chatham (q.v.). He was educated at Pembroke Hall, Cambridge, and called to the Bar in 1780. He did not practise as a lawyer, however, but entered Parliament in 1781 as a supporter of Shelburne. His maiden speech, in favour of Burke's Bill for economical reform, on Feb. 20, delighted the House of Commons, and drew encomiums from the leading orators, Burke, Fox, and North all praising it enthusiastically. His ambition was great, and he decided that he would not begin at the bottom of the ministerial ladder. He declined a minor office under Rockingham,



WILLIAM PITT, THE YOUNGER

but became chancellor of the exchequer under Shelburne in 1782, being then twenty-three years of age. When Shelburne resigned early in the next year, the king offered P. the Treasury, but, tempting though the offer was, the young man, after some hesitation, declined to take office, as he could not then command the necessary support. A coalition ministry was then formed by North and Fox, but was defeated in Dec. on the India Bill, and then P., being still under five-and-twenty, became first lord of the treasury and chancellor of the exchequer. He had everything to contend against. His youth militated against him, and he was in a minority in the House of Commons. He held to office until he felt he had the country with him, and then had recourse to a general election (1784), when he obtained a great majority. He himself was returned for Cambridge Univ., which he represented for the rest of his life. He now devoted his attention to the finances of the nation, and introduced many wise measures, among which was the institution of a sinking fund for the reduction of the

national debt. When George III. became insane in the autumn of 1788, P. defeated the claim of Fox that the Prince of Wales had the right to be regent, and insisted that the regent could only be appointed by Parliament. He maintained a neutral attitude towards the Fr. Revolution but in 1793 France declared war on England, and then P. entered into alliances with many great continental powers, and aided the coalition with large grants for the hiring of troops. The Brit. Navy was successful in its battles, but the coalition suffered severely on land, and there was much dissatisfaction at home, where the mob clamoured for P.'s resignation. He was anxious to make peace, but, being unable to do so on honourable terms, vigorously prosecuted the war. He effected the union of Great Britain and Ireland in 1800, but in the following year resigned office owing to the opposition of the king to a measure of Catholic Emancipation. He was succeeded by Addington, whose administration he at first supported, and he spoke in support of the Peace of Amiens. When war broke out again in May 1803, it was evident that the Addington ministry could not prosecute it effectively, and a year later P. was again called to the helm. He formed a third coalition, but Spain joined France, and the allied forces could not make headway against the combination. P. struggled manfully, but the capitulation of Ulm broke up the coalition, and it is said that the battle of Austerlitz gave him his death-blow. He d. in 1806, his last words being 'Oh, my country! how I leave my country!' He was buried in Westminster Abbey; his debts were paid by the nation. It was the ambition of P. to be a peace minister, and to devote himself to domestic legislation, but it was his destiny from 1793 to be a war minister, and a war minister during a period of terrific conflict. The general opinion is that as a war minister he was not as great as his father, the earl of Chatham, but it is doubtful, taking the different circumstances into consideration, if he was in any degree his inferior. Though without the fire and personal charm of Fox, P. was an excellent orator and a sound debater. His sole aim was the improvement of the state of his country, and the maintenance of its prestige abroad, and to those ends he laboured all his days. See lives by Lord Stanhope, 1862; Lord Rosebery, 1911; and J. H. Rose, 1934; also *Letters to his nephew, Thomas Pitt afterwards Lord Camelford* (2nd ed.), 1804; W. S. Taylor and J. H. Pringle (eds.), *Correspondence, 1838-40*; J. H. Rose, *William Pitt and the Great War*, 1934; D. G. Barnes, *George III. and William Pitt*, 1939; E. Eyck, *Die Pitts und die Fox*, 1946; and Sir T. Lever, *The House of Pitt*, 1948.

Pitta, genus of brilliantly coloured songless passerine b. is typical of the family Pittidae or old-world ant thrushes. One species occurs in W. Africa and the others range from Australia to the Himalayas; one is common in Burma.

Pittacus (c. 650-569 B.C.), noted Gk.

statesman, philosopher, and poet, one of the 'Seven Wise Men of Greece.' He fought successfully against the Athenians, slaying Phrynon (606), and became ruler (*tyrannos*) of Mytilene and Lesbos (c. 589-579). He was a contemporary of Alceus and Sappho. See *Diog. Laërt.*; *Suidas*, *Pittacus*.

Pittosporaceæ, family of trees and shrubs. Some species of *pittosporum* are grown in the garden and greenhouse.

Pitt-Rivers, Augustus Henry Lane-Fox (1827-1900), Eng. soldier and archaeologist. He entered the army in 1845, served in the Crimean war, and rose to the rank of lieutenant-general, specialising in the design and evolution of weapons. Always interested in ethnology, he formed a splendid collection, illustrative of the development and progress of human invention, which he presented to Oxford Univ. On succeeding to the Rivers estates at Rushworth in 1880 he instituted numerous scientifically conducted excavations, which he described in four vols. *Excavations in Cranborne Chase* (1897-1898). He also wrote many articles in scientific journals. P.-R. laid the foundations of modern excavation technique with emphasis on accurate plans and reliables, the significance of stratification, the use of percussion to determine silted pits and ditches, and the great importance of common everyday objects. At Farnham, Dorset, is the P.-R. Museum, with scale models of his excavations, fine ethnographical collections, and prehistoric antiquities. See memoir by H. St. G. Gray, 1905.

Pittsburg, city of Crawford co., Kansas, U.S.A., 130 m. S. of Kansas city. P. has large zinc works, and also manufs. of metal ware, bricks, cigars, and earthenware. It was first settled in 1876, and incorporated as a city in 1880. Pop. 17,600.

Pittsburgh, second city of Pennsylvania and co. seat of Allegheny co., at the confluence of the Monongahela and Allegheny Rs. (which hereafter form the Ohio), 254 m. W. of Philadelphia. It has a harbour frontage of 54 m. It has a riv.-level altitude 702 ft. above sea, but the suburbs are on the heights above the city, which covers an area of over 35 sq. m. The finest building is the Allegheny co. court-house, which cost over \$4,000,000 to build. P. Univ., Duquesne Univ., and the Pennsylvania College for women are all at P. P. Univ. buildings consist of a forty-two-storey skyscraper, accommodating all the students in the univ. There are over 12,501 ac. of park, Schenley Park and Highland Park being the two largest, there being large zoological gardens in the latter. P. is the focus of many trunk railways, including the Pennsylvania, the Baltimore and Ohio, the Erie and P., and the P. Cincinnati, and Chicago, as well as being an important riv. port, handling about 30,000,000 tons of goods each year. The 'smelters' and furnaces make the city a glare of light by night. A quarter of the entire output of pig-iron in the U.S.A. is from P., which is often called the 'Iron City.' There are large petroleum refineries and famous steel works. Prin.

manufs. are nails, rails, steel-plate, stone, and all kinds of electric machinery, for which it is noted; it is also a great ship-building centre. There is much interstate commerce by means of the Ohio R. In 1948 one of the greatest amounts of wealth in the U.S.A. was concentrated in P., in the hands of the descendants of A. W. Mellon. P. occupies the site of Fort Pitt, built in 1759 during the war with Pontiac, an Indian chief. Washington, prospecting in those parts in 1753, saw the suitability of the spot; a stockade was built, but torn out by the Fr., who then here built their Fort Duquesne (1754), in marching on which Braddock was so heavily defeated. With Pitt Prime Minister, the Brit. in 1758 again advanced on Fort Duquesne. The Fr. blew it up and set fire to it. Gen. Forbes announcing success headed his letter 'Fort Duquesne or now Pitt's Borough.' After the opening up of N.W. ter. in 1785, the growth of P. was rapid. It is planned to give P. a new centre and the undertaking is to be called the 'Gateway Center,' because P. is a gateway to the W. The present buildings in an area of 23 ac. of the triangle, two sides of which are formed by the Allegheny and Monongahela Rs., will be demolished, and in place of some of them there will eventually arise nine skyscrapers, and three of these, at a cost of \$50,000,000, are to be built by 1952. Part of the plan is to build on only 20 per cent of the acreage and to make parks of the remainder, thus getting rid, the architects say, of the 'strait-jacket of 60-ft. streets and 200-ft. city blocks.' The Equitable Life Assurance Company of New York has agreed to help to finance the undertaking. Pop. 672,000.

Pittsfield, city in Berkshire co., Massachusetts, U.S.A., on the Housatonic R., 150 m. W. of Boston. It has manufs. of woollens and silks, electrical goods, etc. Pop. 50,000. See Smith, *History of Pittsfield*, 1876.

Pittston, city in Luzerne co., Pennsylvania, U.S.A., in an anthracite coal dist., on the Susquehanna R., 10 m. S.W. of Scranton. It has manufs. of machinery, flour, hosiery, and silk. Pop. 19,000.

Pituitary Body, or *Hypophysis Cerebri*, small reddish vascular body about the size of a pea; it is situated at the base of the brain, embedded in a cavity of the skull known as the *sella turcica*. It consists of two main portions, the anterior lobe, derived from the embryonic mouth cavity, and the posterior lobe, arising as a downgrowth from the brain. The P. B. is an important ductless gland (endocrine organ) secreting many hormones which influence other parts of the body. The secretion of the anterior lobe contains hormones which stimulate the thyroid, parathyroid, and adrenal glands, as well as the sex organs, and the mammary glands (*prolactin*). One anterior lobe hormone is concerned in the regulation of growth; deficiency of this substance is seen in midgelets, whilst excess causes gigantism (in adolescence) or acromegaly (in adults); the latter condition is characterised by overgrowth of bones in the

extremities and the face, the nose and lower jaw becoming especially prominent. The hormones secreted by the posterior lobe are concerned in the regulation of water balance in the body and also cause the contraction of unstriated muscle, including that of the uterus; hence an extract of this lobe is useful in childbirth. Removal of the posterior lobe in a frog causes the skin to become pale, showing that one of the hormones is responsible for expansion of pigment in the pigment cells (melanophores), with consequent darkening of the skin. Without the P. B. life ceases within a few days.

Pit Villages. pits dug out in the earth usually in circular form. The pits were roofed with clay or turf, or skins, raised up from the surface of the ground by a conical arrangement of poles, the silted up holes for which can often be traced. Pit dwellings of the Mesolithic period, the earliest known in Britain, have been excavated near Farnham, Surrey, and in the Colne valley, Essex. Examples dating in the Neolithic period are recorded in Sussex; others were found under round and long barrows in Yorkshire. Many structures described as pit-dwellings were in fact underground storage pits for grain. They have been recognised in villa and hill-forts of the Early Iron Age. From the number and capacity of these silos, archaeologists have been able to assess the yield and acreage of the contemporary fields.

Pit Vipers. see RATTLESNAKES.

Pityriasis (Gk. *πυρρος*, bran), skin disease characterised by the desquamation of branny particles. *P. Seborrhoea capitis* is marked by loss of hair or lack of lustre, constant itching, and the shedding of dry or fatty scales from the surface of the scalp. It leads to baldness, at least in some individuals; 1 per cent to 2 per cent sulphur salicylic ointment forms the best dressing. *P. circinata* & *marginata* is characterised by the formation of pink spots on the limbs and trunk, with fever and itching. *P. rubra* is a chronic inflammatory disease, beginning with deep red patches, which gradually coalesce until the whole body is involved; there is usually a fatal ending. *P. rosea* commences as a rosy-red 'herald patch,' about the size of a shilling, on the trunk, and is followed by a generalised eruption of pink spots, which do not itch. It usually clears up in a few weeks without treatment. Sometimes it is mistaken for secondary syphilis. *P. versicolor* or *Tinea versicolor* is characterised by brownish patches of various sizes, itching, and exfoliation of skin. It is due to the presence of a vegetable parasite, *Microsporon furfur*, which invades the hair follicles. Potassium iodide ointment or mercurial ointment should be applied.

Piura: 1. Cap. of the dept. of P., Peru, 20 m. from the coast, and 80 m. S.E. of Cape Blanco. It was the first permanent settlement made by Pizarro. It is connected by a railroad with the port of Payta (60 m.), and is an important cotton and petroleum market. Catacaos, 12 m. away, has a large manuf. of Panama hats.

P. is on the air route from Cristobal to Santiago. Pop. 30,000. 2. Dept., has an area of 15,190 sq. m.; is mountainous in the E. and desert in the W. Cotton is grown, and petroleum, salt, sulphur, and soda found. Pop. 491,500.

Pius, name of twelve popes:

Pius I. *Saint*, was pope from c. 140 to 154. During his pontificate the heretics, Valentinus and Marcion, visited Rome. P. may have been b. a slave; his pontificate was one of energetic opposition to the Gnostics.

Pius II. (1458-64), Aeneas Sylvius Piccolomini, b. at Corsignano, was made cardinal by Calixtus III. in 1456, and elected pope in 1458. He was interested in eccles. reform and had a scheme of procedure drawn up by Nicholas of Cusa and Dominic de Dominicis (see life by C. Ady, 1913). The great object of his pontificate was the expulsion of the Turks from Europe, but the period of crusading zeal was over, and the discord between the various powers prevented any united action against the Turk. P. at last decided himself to head the crusaders, but d. on the way to Ancona.

Pius III. (1439-1503), Francesco Todeschini Piccolomini, b. at Milan, reigned for only four weeks (Sept.-Oct. 1503) after planning general reform of the Church.

Pius IV. (1499-1565), Giovanni Angelo Medici, belonged to the family of the Medici of Milan. He was elected pope in 1559. His main energies were devoted to carrying through the final sessions of the Council of Trent and his name has ever since been connected with the Profession of Faith which he issued after the council, and to which all holding an eccles. office must give assent.

Pius V. *Saint* (1504-72), Michele Ghislieri b. in Lombardy. Becoming pope in 1566, he was notable for his zeal against heresy and for the vigorous manner in which he promoted and directed the reformation of morals within the Church, and the campaign directed towards recovery of the ground lost at the Reformation. From him came the excommunication of Elizabeth in 1570, and to him was largely due the victory over the Turks at Lepanto in 1571. His pontificate has been described as the most brilliant of the Catholic revival; but some historians have questioned the worth of his methods. He was canonised in 1712.

Pius VI. (1717-99), Giovanni Angelo Braschi, b. at Cesena. He became pope in 1775 and carried on an energetic campaign against Gallicanism and the 'Josephism' of the Emperor Joseph II. During the Fr. Revolution he refused to accept the *Constitution civile du clerge*, and aided the allies against the republic. As a result Napoleon attacked the papal states and forced P. to accept the Truce of Bologna (1796). In 1798 the pope was removed from Rom. and d. at Valence. P. was a great patron of the arts, but many of his schemes were halted by the revolution.

Pius VII. (1740-1823), Luigi Chiaramonti b. at Cesena. A Benedictine, he

was elected pope in 1800, devoted most of his energies to a settlement with France, and concluded in 1801 the famous concordat with Napoleon I. Later relations with Napoleon became strained. Napoleon annexed the papal states and was thereupon excommunicated. P. was then arrested by Fr. troops and imprisoned at Fontainebleau. He was released on the emperor's fall and returned to Rome. P. re-established the Society of Jesus.

Pius VIII. (1761-1830), Francesco Xaviero Castiglioni, b. at Cingoli, carried through no works of importance during his brief pontificate (1829-30), which was notable, however, for the emancipation of the Eng. Catholics.

Pius IX. (1792-1878), Giovanni Maria Mastai-Ferretti, b. at Sinigaglia and elected pope in 1876, he marked the beginning of his pontificate by reforms of a liberal nature. He promulgated a constitution providing for a bi-cameral parliament (1848), which, however, really left untouched the greater problem of popular representation in the papal states. The constitution was prevented from being carried into effect by the revolt of 1848, when the popular enthusiasm for national It. unity overwhelmed all other aspirations. This enthusiasm culminated in bitter hostility towards Austria, but P. proclaimed his neutrality, with the result that two years later he was forced to leave Rome and take refuge in Gaeta, only returning with the assistance of foreign arms in 1850, embittered and reactionary in sentiment. Administration in the papal states now became unprogressive, their very existence being dependent on the continued support of their protectors, France and Austria. This protection, however, was lost after Napoleon had come to an arrangement with Cavour, with the immediate consequence that the pope lost the greater part of his dominions. The one barrier to national unity now remaining, the states of the Church, was removed by 1871 when the papal states were absorbed in United Italy, though P. never accepted the incorporation of the papal states and of Rome into the It. kingdom. As head of the Church P. supported the principles of the Ultramontane party and worked effectively towards that party's eventual success (see ULTRAMONTANE). His pontificate is memorable for the proclamation by the bull of Dec. 8, 1851, of the dogma of the Immaculate Conception of the Virgin Mary; for the Vatican Council proclamation in July 1870 of papal infallibility and the universality of the papal episcopate; and for the restoration, in 1878, of the hierarchy in England. See lives by A. O. Legge, 1875, and T. A. Trollope, 1878.

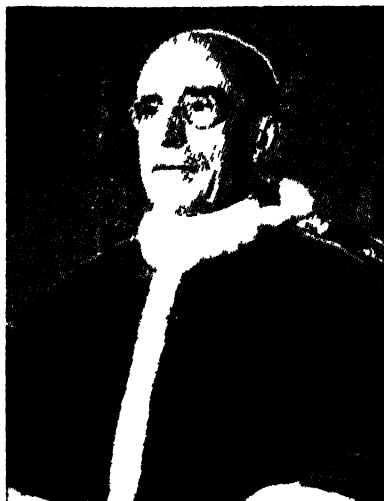
Pius X. (1835-1914), Giuseppe Melchiorre Sarto, b. at Riese. He became pope in 1903 and was a great reforming pope, as his motto *instaurare omnia in Christo* implies. He reorganised the Curia, set up a commission for the revision of the Vulgate, modified the Canon Law, revised the Breviary, promoted the

Gregorian Chant, condemned Modernism, and enjoined earlier and more frequent reception of Communion. He beatified Joan of Arc in 1909. P. also took steps to bring about the reconciliation between the papacy and the It. kingdom which P. XI. was to complete. Since his death there have been numerous petitions for his beatification. See lives by F. A. Forbes, 1918, and R. Bazin, 1939.

Pius XI. (1857-1939), Achille Ratti, b. at Desio, in the diocese of Milan. He studied at Lombard College, Rome, and at the Gregorian Univ. he obtained the triple doctorate in philosophy, theology, and law. From 1882 to 1886 he taught theology at the episcopal seminary in Milan. In 1886 he was at the Ambrosian Library and then librarian at Milan. He was an alpinist and made the first It. traverse of Monte Rosa from Macugnaga (1889). In 1911 he was called to Rome to administer the Vatican Library. He became apostolic nuncio to Poland, 1918, and in 1919 was made titular archbishop of Lepanto. Two years later he was created archbishop of Milan and a cardinal, and was thus only a cardinal of one year's standing when he was made pope (1922). He was a brilliant scholar, and greatly extended the diplomatic relationships of the Holy See. His most outstanding achievement was the solution of the 'Roman Question' in 1929 by the Lateran treaty (q.v.), which restored the temporal power of the papacy and established a concordat between the Church and the It. Gov. In a famous letter, *Non abbiamo bisogno*, he protested in 1931 against the pagan worship of the state in Fascist Italy, and the denial in matters of education of the natural rights of the family as well as the supernatural rights of the Church. In a yet more famous letter, *Mit brennender Sorge*, in March 1937, he protested against the violation of natural law and justice in Nazi Germany, and reminded Hitler that man as a person possesses rights which must be preserved against every attempt by the community to deny, suppress, or hinder their exercise. In the same week, in a letter *Divini Redemptoris*, he condemned atheist communism as 'a gospel full of errors and illusions' which destroyed the foundation of social order and denied the rights, dignity, and freedom of human personality. See life by W. and L. Townsend, 1930; also W. Solzharchel, *Pius als Verleider der menschlichen Persönlichkeit*, 1939.

Pius XII. (b. 1876), Eugenio Pacelli, b. near Viterbo. From 1904 to 1914 he was prof. of eccles. diplomacy at Rome. In 1917 he became titular archbishop of Sardes. He went as nuncio to Munich in 1917, and to Berlin in 1920, negotiating the concordat with Bavaria in 1924. He was made a cardinal in 1929, and became secretary of state the following year. He was P. XI.'s chief adviser in the latter's anti-Nazi policy, and his election as P. XII. on P. XI.'s death (1939) was interpreted as implying a continuation of the Vatican's anti-Nazi attitude. P. made many vain efforts to prevent the Second

World War by offers of mediation. In Dec. 1939 he denounced 'premeditated aggression' and 'contempt for freedom and human life from which originate acts which cry to God for vengeance,' and he made continual efforts to help Catholic and non-Catholic war victims on both sides. He attempted to prevent Mussolini from driving Italy into the Second



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POPE PIUS XII.

World War, and after the close of fighting made efforts to aid the re-estab. of religion in Germany. He has continually and strenuously opposed the eccles. policy of Communist countries in E. Europe. See O. Walter, *Pius: Leben und Persönlichkeit*, 1939, and J. F. Diinneen, *Pius, Pope of Peace*, 1939.

Pix, Trial of the, see PYX.

Pixy, or Pixie, name given to one kind of fairy in Devon and Cornish folk-lore. The word is by some considered to be the same as 'pucksy,' the diminutive *sy* being added as in Betsy or Topsy. 'Pixy' is only P. transposed. Mrs. Bray derives the word from 'pygmy.' In Truro moths, which were regarded by some as departed souls, by others as fumes, were called 'pixies' (cf. Gk. ψυχή, which is both 'soul' and 'moth'). Ps. were believed to kidnap children and to lead travellers astray, like will-o'-the-wisps, whence the phrase 'pixy-led.' In fairy mythology everything that is done elsewhere by fairies, bogbarts, or similar beings is done in Devon by Ps. According to Hunt the 'piskie' is a 'most mischievous and very unsociable sprite' and his favourite fun is to entice people into the bogs by appearing like the light from a cottage window, or as a man carrying a lantern. He partakes, in some respects, of the character of the Cornish

'spriggan.' But the P. is evidently a merry type of fairy, for to 'laugh like a Piskie' is or was a popular saying. See T. Keightley, *Fairy Mythology*, 1828; Mrs. A. E. Bray, *Traditions, Legends, Superstitions, and Sketches of Devonshire*, 1838; and H. Hunt, *Popular Romances of the West of England*, 1865, 1923.

Pizarro, Francisco (1478-1541), discoverer and conqueror of Peru, the natural son of Gonzalo P., an officer who served with great distinction under *el Gran Capitán* in the Neapolitan wars, b. at Truxillo. In early life he became a soldier and went to America. Among other expeditions, he took part in those of Ojeda and Nuñez de Balboa. When he had already served for fourteen years he joined Hernando de Lugo and Diego de Almagro in a project for extending the Sp. conquests along the S. coast. In 1524 he sailed from Panama with a single ship and about 100 men, leaving Almagro to follow with reinforcements as soon as possible. The expedition was not successful, and P. returned in 1528 to Panama, and then he returned to Spain. Here he got himself appointed governor over all the country to be discovered, with supreme authority in all matters. The new expedition started in 1531, and P. was now completely successful. Peru was at that time divided by a civil war between the two brothers Atahualpa and Huascar, and of this full advantage was taken. Almagro passed on to Chile, but a quarrel which arose between him and P. led to his execution in 1538. His son then formed a centre of dissatisfaction for the many who were dissatisfied with the conquistador's rule, and a party of these ultimately assassinated P. in 1541. See W. H. Prescott, *History of the Conquest of Peru*, 1889, and P. Shay, *Incredible Pizarro, Conqueror of Peru*, 1932; also life by L. Baudin, 1930.

Pizzicato, term used in music composed for stringed instruments to denote that the strings are to be plucked with the fingers as in a harp instead of sounded with the bow. It was first employed by Monteverde (1568-1643).

Place, Francis (1771-1854), Brit. reformer, b. in London, was a tailor there, but from an early age was interested in political affairs. He took an active part in securing the return of Sir Francis Burdett for Westminster in 1807, and became on intimate terms with Robert Owen, Mill, Bentham, and Hume. He issued many pamphlets, and left an autobiography, not yet pub. It was largely P.'s agitation which brought about the repeal of the Combination Act in 1824; but after the passing of the Reform Bill in 1832 his political influence declined. See life by G. Wallas, 1898.

Place-names, see under NAMES.

Placenta, or After-birth, structure which unites the foetal mammal to the womb of the mother until birth, in which foetal and maternal blood circulate, so establishing a nutritive connection between them. The connection is, however, merely by diffusion: there is no actual intermingling of foetal and maternal blood. The P. is

essentially mammalian, but is not found in egg-laying monotremes, and is only rudimentary in marsupials, which bring forth their young very imperfectly developed, after a very short gestation. In all other mammals it occurs as a double vascular sponge, which enables the fetus to obtain nourishment and oxygen from the blood of the mother, and to remove its waste (excretory) products. A somewhat similar structure occurs in two cartilaginous fishes and two lizards. The P. commences from the allantois (*q.v.*), which grows out into the space between the inner (amniotic proper) and the outer (subzonal membrane) folds of the amnion (*q.v.*). The allantois unites with the subzonal membrane, and from this united area (true chorion) vascular villi grow out into crypts in the uterine wall. Simultaneously a part of the uterine wall becomes modified into a spongy vascular tissue. Thus the P. consists of two parts, the maternal, or the modified portion of the uterine wall, and the embryonic, or that part of the allantois fused to the subzonal region which gives off villi, and therefore a more or less intimate union is formed between the embryo and the mother. The embryonic part of the P. is naturally shed at birth, and in some cases the maternal part is also discharged. In the latter case the placenta is said to be deciduate and when only the embryonic part comes away, then it is said to be indeciduate. Of indeciduate placentations there are two varieties: (1) diffuse, as in lemurs, cetacea, and ungulates (except ruminants), when the villi are uniformly scattered over the embryonic sac; and (2) cotyledonary, as in ruminants, when the villi occur in patches. Of deciduate placentations three types may be noted: (1) zonary, as in elephants, carnivora, etc., when the villi form a band around the embryo; (2) discoidal, as in rodents, bats, and insectivores, when the villi form a disk; and (3) metadiscoidal, as in monkeys and man, when the villi are first diffuse or scattered, and afterwards collected into a disk. See ALLANTOIS, AMNION, FETUS, MAMMALS, etc.

Placenta, or **Placenza**, see **PIACENZA**.

Placenta, seaport of Newfoundland, at the E. side of P. Bay. Pop. 2,000.

Placer Deposits, see under **MINING**.

Placitum Regium, i.e. royal consent, term used to denote the approbation by a civil ruler of papal or eccles. enactments by which they acquire binding force within his territory. If this approbation is given by the ruler himself it is called an *exequatur* (i.e. let him act), if by a subordinate it is a *P. R.*

Placioid Fishes, see **ELASMOBRANCHII**.

Plagioclase, general name given by petrographers to the triclinic feldspars, which may be regarded as mixtures in various proportions of albite (soda-feldspar) and anorthite (lime-feldspar). Oligoclase (soda-lime) and labradorite (lime-soda) are P. feldspars, the latter showing a peculiar iridescence. Under the microscope the crystals show a fine parallel lineation, which indicates polysynthetic twinning and distinguishes them from

orthoclase. In polarised light P. shows grey and yellow colours, the twinning bands being clearly seen. P. is a characteristic constituent of basic and sub-basic igneous rocks, but also occurs as an accessory in the more acid rocks. On weathering these feldspars decompose into kaolin, calcite, prehnite, and zeolites.

Plague, in general, any fatal epidemic disease. The modern application of the term is, however, restricted to that disease also known as *bubonic (q.v.)* and *Oriental P. P.* which is due to the presence of a specific micro-organism, *Bacillus pestis*. Although bubonic P. is usually associated with the formation of buboes, or inflamed lymphatic glands, there are three varieties recognised, in two of which no such manifestations are to be observed. In the variety which is specifically known as bubonic the most prominent symptoms are, in the early stage, headache, delirium, sleeplessness, and high temp.; constipation is usually an accompaniment, but it may be followed by diarrhoea in severe cases. The characteristic symptom is, however, the appearance of the buboes, which usually occur on the second day. They most commonly appear in the groin or in the armpit, and tend to suppurate with sloughing of the skin, though this should be anticipated by surgical measures. The lymphatic glands remaining become swollen the liver, spleen, and kidneys become enlarged, the lungs are engorged, and the tendency is towards collapse through the general congestion and oedema. The pneumonic variety of P. is accompanied by all the characteristic symptoms of broncho-pneumonia. The course of the disease is rapid and the chances of recovery small. Unless the disease is prevalent, its identification depends upon the discovery of the bacillus, which is contained in the sputum. The third, or septicæmic, variety bears the general symptoms of the bubonic variety with the exception of the presence of buboes. The lymphatic glands are enlarged, but without the effect on the surrounding tissues observed in bubonic cases. The condition almost invariably terminates with death in a few days, after acute delirium and extreme prostration.

The nature of the disease known as P. has been investigated with some success during modern times, and although no specific cure can be said to have been elaborated, the adoption of precautionary measures is likely to restrict the area of its incidence considerably. The hist. of P. epidemic appears to point to the fact that the bacillus is operative in quite a small area as compared with the widespread attacks of earlier times. P. of the specific bubonic type was undoubtedly known in Europe and N. Africa in the sixth century, and the series of epidemics known as the Black Death in the fourteenth century appears to have consisted mainly, at any rate, of P. visitations. Observers of the time trace the origin of the Black Death (*q.v.*) to travellers from the E., probably China. By 1348 practically the whole of Europe was involved, and it is calculated that one-fourth of the

pop. of Europe, that is 25,000,000 people, perished in these epidemics.

In 1894 the *Bacillus pestis* was identified by Kitasato, and subsequent investigators have demonstrated that rats may be attacked, and that infection may be carried to man by means of the rat flea, which may attack human beings when rats are scarce. In 1910-11 septicemic and pneumonic P. made its appearance in Manchuria; in this epidemic the infection seems to have been conveyed by marmots, which are trapped for the sake of their fur. The influence of animal infection seems now to be well estab., and precautionary measures aim at the elimination of this danger. Inoculation by

early in the year, producing an enormous number of buoyant eggs.

Plaid, see HIGHLAND DRESS and TARTAN.

Plain, geographical term applied to a level surface of land at a low elevation from the sea. Extensive tracts of level land at a high altitude are usually called plateaux or table-lands, but in certain cases, such as the Ps. E. of the Rockies, where the elevation from sea level to a great height is gradual, the term 'plain' is retained. The most characteristic Ps. are those which extend over the basin of a large riv., and are caused by erosion and deposition. Of such a kind may be noted the P's. S. of the Himalayas forming



Bibliothèque Royale de Belgique: MS. 13076-7, f. 24.

PLAQUE: THE BLACK DEATH

Hastkine's fluid procures protection in a majority of cases, and this method is employed in connection with Indian hospital staffs. As the period for which immunity endures is somewhat short it is hardly practicable to make a widespread use of inoculation. See D. Defoe, *Plague in London*, 1665, 1886; T. Dekker, *Plague Pamphlets* (ed. Wilson), 1925; A. M. Campbell, *Black Death and Men of Learning*, 1931; *Present Remedies against the Plague*, 1603 (News No. 62, 1665. Ed. Barratt), 1933; and A. Praviel, *Peste de Marseille* (1720), 1937.

Plaice (*Pleuronectes platessa*), valuable flat fish which is abundant around Brit. coasts, and is taken by the trawl. The mouth is small, the scales smooth and minute; the colour above varies from brown to black with bright red or orange spots and is white beneath. The eyes are on the right side. The lateral line is nearly straight. The average weight is about 3 lb., and though 15 in. is about the average length, specimens twice as large are sometimes caught. The female spawns

the basin of the Ganges, the Ps. of the Mississippi, Mesopotamia, the Rhine, etc. Ps. may also be due to denudation, such as the sandy wastes of Arabia, and the desert of Sahara in N. Africa. Large tracts of comparatively level land, only broken here and there by cliffs or low hills, are often called by various names, such as the prairies of N. or the pampas of S. America and the steppes of E. Europe.

Plainfield: 1. City in Union co., New Jersey, U.S.A., 24 m. W.S.W. of New York city. It has manufs. of printing presses, machine tools, silk and cotton goods. It is the headquarters of the Seventh Day Baptists. Pop. 37,500. 2. Tn. in Windham co., Connecticut, U.S.A., 16 m. N.E. of Norwich; it has manufs. of cottons, woollens, and yarn. Pop. 7600.

Plain Song, Plain Chant, or Gregorian Chant, sometimes known also as Canto fermo (q.v.), system of music used chiefly in the churches of the Rom. Catholic communion for the greater part of the liturgy. In the early Church there were

sev. forms of P. S., but the Rom. form gradually supplanted the others and acquired the name of Gregorian Chant on account of the tradition that it was systematised and perfected by St. Gregory the Great (590-604). In the eighteenth century there grew up a practice, particularly in France, of introducing grace notes and passing notes into the P. S. This was done *extempore* by the priest and in time led to textual corruptions, which were, however, swept away by the official adoption, under decree of Pius X., of the P. S. version pub. by the Benedictine monks of Solesmes, who photographed numbers of MSS. in the European libraries, collated them and set the text according to the weight of MS. evidence for any particular version. With the Catholic revival within the Anglican Church P. S. has been adopted in a large number of churches. See also NOTATION.

Plains of Abraham, see ABRAHAM, PLAINS OF.

Plaintiff. In law the P. is the party who sues in a civil action, the party who is sued being the defendant. In Scotland the parties are styled 'pursuer' and 'defender' respectively. The term P. is not used in reference to criminal proceedings, the analogous party being called the prosecutor, or, impersonally, the Crown or the prosecution, where the proceedings are taken in the name of the Treasury.

Planarian, group of non-parasitic flat worms of the subdivision Turbellaria which, with Trematoda and Cestoda, comprise the group Platyhelminthes. They are usually small, flat, soft creatures, common both in fresh water and in the sea, where they may be found under rocks and stones in pools. Some of them are brilliantly coloured, and a few tropical forms are sev. in. long. A common fresh-water P. is black, and may often be seen like a drop of black sealing-wax on the leaves of aquatic plants. It feeds on insects, small molluscs, and lower organisms. The mouth is on the under side of the body; the skin is furnished with the protective vibrating hairs or cilia, whence the name Turbellaria is derived. Ps. multiply sexually and also by div. From them the parasitic Trematodes (flukes) appear to be derived.

Planck, Max Karl Ernst Ludwig (1858-1947), Ger. physicist, b. at Kiel. He was the son of a prof. of constitutional law who was a joint author of the Prussian civil code. He was educated at Berlin and Munich Univs., and became assistant prof. at Kiel in 1885. In 1892 he was appointed prof. of experimental physics at Berlin, and from 1913 to 1914 he was rector of Berlin Univ. P. received the Nobel prize for physics in 1918, was made a foreign member of the Royal Society in 1926, and was awarded the Copley medal in 1929. He was invited to England in 1946 for the Royal Society's celebrations on the Newton tercentenary. Kirchhoff, under whom P. had studied, had shown that, in an enclosure where all the objects were at the same temp., the heat radiation was divided between different parts of the spectrum in a way that was independent

of their nature. P. set himself to discover the formula relating the energy of particular wave-lengths with the wave-lengths and temp., using as a guide the accurate measurements made by Lummer and Pringsheim. Thus in 1900 P. initiated the quantum theory (q.v.) now one of the foundations of physics, with applications in nearly every branch of the subject. P.'s works include *Hauptsätze der mechanischen Wärmetheorie* (1879); *Gleichgewichtszustände isotropischer Körper* (1880); *Prinzip der Erhaltung der Energie* (1887); *Grundrisse der allgemeinen Thermochemie* (1893); *Vorlesungen über Thermodynamik* (1897); *Vorlesungen über die Theorie der Warmestrahlung* (1906); *Einführung in die Theorie der Elektrizität und des Magnetismus* (1922); *Physikalische Rundblicke* (1922); *Die Ableitung der Strahlungsgesetze* (1923); *Das Weltbild der neuen Physik* (1929); and *Wege zur Physikalischen Erkenntnis* (1933). See H. Hartmann, *Max Planck als Mensch und Denker*, 1938.

Plane, carpenter's cutting and surface-smoothing tool, of which there are many varieties according to the nature of the surface they are required to produce or some peculiarity of construction: (1) Ps. for producing smooth surfaces of indefinite width; (2) Ps. used to form P. surfaces of definite and usually narrow width; and (3) Ps. designed to produce curved or moulded surfaces.

Planing Machine.—Planing machines for wood-working are of various kinds, which may be classified into fixed-knife machines having the same action as a hand P. and used for producing a smooth surface on small stuff; and rotary block machines, of which there are two types, surface-planers and panel-planers or thicknessing machines. These latter are used to reduce boards or pieces to an even thickness ready for dressing to shape.

Plane, or *Platanus* small genus of trees (family Platanaceae) with large leaves and globular or button-like catkins, the female florets being followed by burr-like nuts. The bark of the trunk and main stems flakes off annually in rectangular scales, and this habit and the smooth polish of the leaves cause the harder species to be excellently suited for culture in smoky towns. The so-called London P. (*P. acerifolia*) has sycamore-like leaves, and many fine specimens grow in the London squares. *P. orientalis*, the oriental or common P., is a native of the Levant. It has a rounded outline, and the deeply five-lobed leaf has a wedge-shaped base. Some fine and massive specimens exist in England. *P. occidentalis*, the W. P., button-ball or button-wood of N. America, has less deeply divided leaves and a looser outline. It is not sufficiently hardy for successful culture in Britain. The timber of the P. is hard, tough, and fine grained, and has many special uses.

Planetarium, mechanical device for showing the orbital and rotatory movements of the prin. bodies of the solar system and also of the stars. See ORRERY.

Planetoids, see ASTEROIDS.

Planets (Gk., wanderers) were named to distinguish them from the stars, 'fixed' in

that stars keep their relative configuration. The ancients counted seven, including the Sun and Moon, Mercury, Venus, Mars, Jupiter, and Saturn. The Sun and Moon are not so reckoned now, but others shown in the table have been added, including the Asteroids (*q.v.*). All the planets revolve round the sun in elliptical orbits, those whose orbits are within that of the Earth are *inferior*, those without, *superior*. P. Mercury, Venus, and Mars are also classed as 'terrestrial,' being comparable in size, density, and geological stage with the Earth; the others, except Pluto, being larger, less dense, in an earlier stage. The inferior P. show phases like the Moon, appear to 'oscillate' across the heavens, i.e. their apparent motions are direct, retrograde, or stationary (as are those of the superior planets); they sometimes 'transit' at inferior conjunctions; are

of the figure is therefore the area generated by the rod to which the tracer is attached. This may be expressed by reference to the roll of the wheel mounted on the tracer rod and the angle through which the wheel turns. In general this angle is 2π , as the wheel returns to its original position when the boundary of a closed figure has been described, so that the amount of rolling of the wheel gives a measure from which the area of the figure can be calculated or read off by reference to a scale.

Plankton (Gk. *πλαγκτος*, wandering), name given by Victor Hensen (1887) to plants and animals possessed of little or no means of independent locomotion and found floating or drifting in water. Most P. organisms are colourless or faintly bluish, inconspicuous, gelatinous, and transparent. Marine P. is much richer than fresh-water P. in both kind and

Name	Mean Distance from Sun (million miles)	Diameter (miles)	Velocity (m. per sec.) at mean distance from sun	Satellites
Mercury	36.0	3,000	29.7	None
Venus	67.2	7,600	22.0	None
Earth	92.9	7,927 (E), 7,900 (P)	18.5	1
Mars	141.5	4,200	15.0	2
Asteroids	135-400	10-243	11-15	None
Jupiter	483.3	88,700 (E), 82,300 (P)	8.1	11, 3 retrograde
Saturn	886.0	75,100 (E), 67,200 (P)	6.0	9, 1 retrograde
Uranus	1,783	30,900	4.2	5, all retrograde
Neptune	2,793	33,000	3.4	2, both retrograde
Pluto	3,666	3,000	2.9	Not Known

(E) equatorial

(P) polar

invisible at inferior conjunction; they are visible only for a few hours at the most, before or after sunset, except in high latitudes. The superior P. appear to move westwards relatively to the sun, invariably coming to the meridian earlier each night by solar time. In longitudinal motions the P. do not return on their tracks, but describe loops showing a latitudinal variation owing to the inclinations of their orbits.

Neptune, Uranus (generally), and the planetoids except *Vesta*, and all satellites except the Moon, are invisible to the naked eye. All P. appear as disks through the telescope, whereas no star shows any sensible disk. See ASTRONOMY, BODIES, and SOLAR SYSTEM.

Planimeter, instrument for the determination of the area of any figure. The best-known form is *Amsler's*. It consists of two metal rods joined by a hinge; one of the rods possesses a sharp point at the extremity which is driven into the drawing-board, while the other is fitted with a wheel capable of making an impression upon the measuring paper; the free end of the latter rod consists of a point known as the tracer, which is guided round the boundary of the figure to be measured. In using this instrument the hinge moves backwards and forwards over an arc of a circle whose radius is the length of the rod with fixed extremity. The area

number of species. The number increases in fairly still water, and consequently lakes and ponds have more P. than rivers. The P. plants are mainly diatoms and small algae. The animals consist chiefly of Protozoa, larvae of Crustacea, Mollusca, Echinodermata, eggs of fish and other animals, small Crustacea, and a few pelagic worms, e.g. *Sagitta*, the arrow worm. Great numbers of the phosphorescent Protozoon, *Noctiluca*, form luminous areas in the sea. The P. varies not only seasonally, but also in adjacent small areas and at different depths of water. Much valuable information on P. was secured before the Second World War by H.M. research ships *Discovery I.* and *II.* (See DISCOVERY COMMITTEE.)

Plantagenet, surname used of the Angevin house which succeeded to the throne of England in 1154 in the person of Henry II., and ruled until the deposition of Richard III (1399). The houses of York and Lancaster, which succeeded, being descended from Edward III., are generally included in the P. line. The name is said to have been derived from the custom of Geoffrey of Anjou, father of Henry II., of wearing a sprig of broom (*Planta genista*) in his cap. Since the time of Charles II. P. has been applied to all descendants of Geoffrey, count of Anjou. It was a personal emblem of Geoffrey, but was never borne by any of his descendants.

until Richard, duke of York (father of Edward IV.), who assumed it probably about 1448. See J. Harvey, *The Plantagenets, 1154-1485*, 1948.

Plantaginaceae, family of plants, with ribbed or fleshy leaves usually radical, and flowers mostly borne in spikes. Sev. species are common plants in Britain; the two Brit. genera are *Plantago* (plantain) and *Littorella* (shoreweed).

Plantain, or *Plantago*, genus of herbaceous plants which includes five Brit. species, some of which are troublesome garden weeds. The greater P. or waybread (*P. major*) has radical ribbed leaves and long tapering spikes, bearing purple-anthered flowers; the seeds are used as a food for cage birds. Other species are the hoary P. or lamb's tongue (*P. media*), ribwort P. (*P. lanceolata*), *P. maritima*, and *P. coronopus*. One of the few species of horticultural value is *P. coriacea*, which bears tall spikes of white flowers. Sev. Indian species have medicinal value.

Plantain, or *Pisang*, see under BANANA. **Plantain Eaters**, or *Musophaga*, genus of picarian birds, all of which are African forest birds, characterised by the hind toe being able to turn backwards or forwards, and by the base of the bill being dilated. They all have beautiful crests, which can be elevated or depressed at will. The colouring is blue or green with red primaries, the pigment of which is soluble and is washed out during the rainy season, though quickly renewed.

Plantation, assemblage of planted growing plants, especially trees; also an estate on which sugar, cotton, oil palm, tobacco, etc., are cultivated. The term was originally applied specifically to the Brit. settlements in America and then to any large estate in N. America, the W. Indies and E. Indies, which was cultivated chiefly by Negro or other slave labour, living in distinct communities on the estate under the control of the proprietor or manager. In this sense the term P. was synonymous with *colony* and the first separate organisation in Britain for the central administration of colonial affairs was a committee of the Privy Council, appointed by Order in Council of July 4, 1860, 'for the Plantations'. On Dec. 1, 1860, a separate 'Council of Foreign Plantations' was created by Letters Patent. In Sept. 1872 the council was united by Letters Patent, to the 'Council for Trade and was henceforward known as the 'Council of Trade and Plantations' (see further under (COLONIAL OFFICE)). P. song denotes the kind sung by Negroes on Amer. Ps. See also NEGRO SPIRITUALS.

Plant-eating Beetles, see WEVILS.

Plant's Cell, see ACCUMULATOR.

Plant Hormones, or growth-regulating substances, may initiate, inhibit, or accelerate growth activities in various parts of a plant. Charles Darwin postulated their existence in his *Power of Movement in Plants*, 1880. They may be extracted from plant tissues but are now synthesised in laboratories. First practical use of a plant hormone was made in 1929. Since then over a hundred chemicals have been synthesised which possess

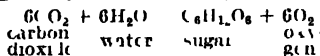
(the power to regulate plant growth in some way. Correct concentration is important; minute dilutions can cause major growth activities, large amounts can kill plants. The chief practical applications of P. H. at present are: (1) to promote rooting in cuttings, etc. The synthetic substances used are usually derived from phenoxy-acetic acid and may be used in powder or liquid form; (2) to induce fruit-formation by unfertilised ovaries, notably in tomatoes, and cucumbers, but also in apples and berry fruits. Substances based on beta-naphthoxy-acetic acid are used for this. Artificially stimulated fruits grow to some size, and are seedless; (3) to delay flower-bud development in fruit trees to avoid frost damage by use of iodo-acetate; (4) to control pre-harvest fruit drop, chiefly in early apples. Alphanaphthalene-acetic acid (N.A.A.) is effective in this; (5) to selectively control weeds in cereals and lawns; 2-methyl-4-chlorophenoxyacetic acid (M.C.P.A.) and 2:4-dichloro-phenoxyacetic acid (D.C.P.A.) are widely used; (6) to prevent sprouting on stored potatoes and roots, using alphanaphthyl-acetic acid. See also GARDENING; LAWNS; WEEDS.

Plant-house, see Hothouse. **Plantin**, Christophe (c. 1520-89), Fr. printer, b. at St. Avertin, near Tours. In 1555 he set up at Antwerp one of the largest printing houses in Europe. His works were famous for their accuracy, their beautiful workmanship, and finish, and he secured many influential patrons. The most noted of his publs. is the *Biblia Polyglotta* (8 vols., 1569-73). He also set up printing houses in Leyden and Paris, which were carried on by his sons-in-law. In 1876 the Antwerp house was purchased by the city and opened as the Musée P.-Moretus. One style of printer's type face is named after him. See M. Rooses, *Le Musée Plantin-Moretus*, 1913.

Plants and Planting. The term plant applies to every member of the vegetable kingdom, from the vast forest trees to the minute organisms such as bacteria. Between familiar and higher types of plant life and those of animal life are very obvious differences, but, as the lower members of the two kingdoms are examined and compared, the differences become much less obvious, and indeed it is impossible to draw a hard line of separation. In fact, it may be said, the living world, the world of organisms capable of reproducing themselves, is essentially one, the living substance within them being in each case *protoplasm*.

The group of organisms which the biologists have been most puzzled to classify is that known as the Mycetozoa or Myxomycetes, a commonly known member of which is *Plasmodium* *Brassicae*, the cause of club root or finger-and-toe in cruciferous plants. The Myxomycetes have the appearance of being the oldest existing form of life, and there is considerable support for the theory that they have been, or differ but little from, the parents of the whole organic world. Though there are plants which essentially require organic life for their subsistence, it

is a general rule that green plants exist for the conversion of inorganic matter into the living substance necessary without exception for every form of animal life. A considerable part of the dry weight of plants consists of carbon, and yet green plants can flourish and increase when they are supplied with a solution of essential food materials from which carbon is absent. These plants are able to take in carbon dioxide from the atmosphere, and, in the presence of light, which provides the necessary energy, to build it into complex compounds. The changes are accomplished with the aid of the chloroplasts, which are usually small rounded structures containing chlorophyll, a green pigment of very complex chemical structure. Some plants, the algae in particular, have large chloroplasts of various shapes, e.g. basin-shaped in *Chlamydomonas*, a spiral ribbon in *Spirgyra*. Usually the first product of the synthesis is a soluble sugar which is rapidly converted into starch, a carbohydrate much more conveniently stored by the plant. Some green plants build other carbon compounds such as oil. The process of synthesising complex carbon compounds from carbon dioxide and water is termed carbon assimilation or *photo synthesis*, and is accompanied by the liberation of oxygen. Assuming that a hexose sugar such as glucose, is formed, the equation will be



This process seems to be the very basis of life itself. Chlorophyll is entirely absent from the fungi, and these and a few higher plants which have adopted a parasitic or saprophytic life, obtain their carbon in the form of organic compounds, from living or decaying animals and plants. (See SAPROPHYTES; PARASITIC PLANTS.) Many others utilise this source of carbon to a less extent.

Chemical analysis shows that, besides carbon, the following elements are always present in the compounds which form the body of a healthy green plant: hydrogen, oxygen, nitrogen, chlorine, sulphur, phosphorus, silicon, potassium, sodium, calcium, magnesium, and iron. Other elements are frequently present, such as bromine and iodine which are rarely absent from seaweeds. But a plant can be grown with success in a solution containing those elements mentioned and apparently sodium, silica and chlorine are not indispensable, though almost universally met with. A great variety of chemical changes known as metabolic processes or metabolism (*q.v.*), are continually in progress in the plant, breaking down and building up complex compounds, constructing sugars and other carbohydrates from simple inorganic food materials, and converting nitrogen compounds in the soil (or, in the case of leguminous plants the nitrogen of the atmosphere) into proteins and other complex food materials. These are utilised by the plant in diverse ways, and after its immediate nutritive requirements are satisfied the excess may be

stored in various parts of the plant; in vegetative parts the store may be drawn upon for renewed growth after a resting period, or for the production of flowers and seeds. The seeds are stored with sufficient food to enable germination to proceed, and often with enough to allow the young plant to establish itself securely before becoming entirely dependent on its own ability to make food. Trees and shrubs store their reserve material chiefly in the stems. Herbaceous perennials in the rhizomes or root stock, and bulbous plants in the leaves of the bulbs.

It is in the production and storing of the surplus food that most plants become of economic importance, by selection and breeding the storage capacity is greatly increased. A very remarkable instance of this is the sea beet (*Beta maritima*), a perennial plant with a tough, moderately thick fleshy tap root, common on muddy seashores. From this has been derived the garden beet, the mangold or field beet, and the sugar-beet, in all of which, as in the sugar cane, cane sugar is dissolved and stored in the cell sap.

It is to a large extent due to the lack of an adequate proportion of the various essential plant foods in particular soils that much of the loss of cultivated crops by disease is due though hereditary susceptibility to disease has been proved by the experiments of Prof. Biffen at Cambridge, and of others.

The power of producing new and separate individuals is characteristic of all living organisms. For practical purposes there are two distinct modes of reproduction among plants: sexual reproduction is the fusion of a male and a female reproductive cell. Amongst many fungi sexual reproduction has hitherto been undiscovered, amongst others it is of a very rudimentary form and there is no physiological sexual distinction, neither between the nuclei which fuse nor the organs or cells containing them. Since the fusion initiates the development of a fructification it is generally regarded as a form of sexual reproduction. Strictly, asexual terminology is used to describe the reproduction of such fungi. In the flowering plants or Phanerogams, the male reproductive cell is enclosed within the pollen grain produced in the stamens. The female reproductive cell lies in the ovule. In one section (Angiosperms) of the Phanerogams, the ovules are enclosed in the ovary of the flower, in the other section (Gymnosperms) they are exposed. The ovary is formed from a modified leaf or carpel, the tip of which is called the stigma and forms a receptive surface for pollen. This is usually brought from another flower by wind insects (mainly bees), humming birds in the tropics, rain, and by water currents. In the case of aquatic plants some flowers, however, have special devices for pollinating their own stigmas. Cross-pollination fails. The pollen grain sends out a tube which penetrates the tissue of the stigma, or of the exposed ovule, and continues growth until it enters the ovule and liberates the male nucleus from the tip of the tube. By

the fusion of this nucleus with the egg cell in the ovary, the act of fertilisation is completed. A number of plants (e.g. rice) are undoubtedly self-fertilised, including some of the commonest weeds, which are thus independent of any cross-pollinating agency.

Vegetative reproduction, the other mode of giving rise to new individuals, consists in the separation, naturally or artificially, of portions of the vegetative organs of the parent. It is an example of a sexual reproduction. The strawberry and many other creeping plants send out runners or stolons, the buds on which become rooted and form separate plants. The potato produces thin underground rhizomes, which thicken into tubers at their tips. This habit of vegetative reproduction is so strongly developed in some plants, e.g. the common couch or twitch, that the tiniest portion of the underground parts of the plant are capable of growth. Of the numerous methods of producing new plants artificially, that by means of a cutting or portion of a stem or leaf is the commonest, and immense numbers of garden plants are increased in this way. Another method is by layering, which consists in bending and pegging down a shoot of a plant into the soil, usually after making an oblique slit or ring from which adventitious roots are produced; this method is used for carnations. Budding, removal of a bud from one plant and its insertion into the stem or stock of another; and grafting, the insertion of a shoot with sev. buds upon it into a stock, are processes commonly applied to dicotyledonous plants of a woody nature, such as roses and fruit trees. By this means plants of different species and even of different genera can be united, e.g. the pear on the quince, the tomato on the potato, and the medlar on the hawthorn.

One main div. of the vegetable kingdom is the *Cryptogamia*, or flowerless plants, which have no flower and reproduce themselves by spores. Among these are the algae, mosses, and ferns. The other main div. is the *Phanerogamia*, or flowering plants, which bear obvious flowers consisting of stamens and pistil and usually a perianth; they reproduce themselves by seeds containing an embryo, and are divided into two main groups. Of these the Gymnosperms have the ovules developed directly upon the axis, as in the yew, or upon open carpellary leaves, as in the cones of the pine, fir, and larch. In the Angiosperms the ovules are contained in a closed ovary. This group includes the great majority of flowering plants and is subdivided into the dicotyledons and the monocotyledons, distinguished by the number of cotyledons or seed leaves present. The monocotyledons may usually be distinguished by the internal structure of their stem, the parallel venation of the leaves, and the arrangement of the floral leaves in series of three. The growth of the plant is accomplished by cell div. (see CROGOGY) and the production of additional mechanical supporting tissue as height increases is an

interesting feature of plant mechanics (see CAMBIUM). The growth of most plants is considerably influenced by the presence and intensity of light. Many interesting adaptations are revealed by the study of the plant in relation to its habitat. See ECOLOGY; LEAF; MORPHOLOGY; NATURAL ORDER OF PLANTS; TRANSPIRATION. See C. Baltet, *The Art of Grafting and Budding*, 1903; L. H. Bailey, *Manual of Cultivated Plants*, 1924; L. Cockayne, *New Zealand Plants and their Story*, 1927; F. T. Brooks, *Plant Diseases*, 1928; W. R. Peel, *Grassland Management for the Practical Farmer*, 1938; H. Godwin, *Plant Biology*, 1939; H. Nicol, *Plant Growth-Substances*, 1940; G. M. Thomas, *Plant Physiology*, 1940; H. Martin, *The Scientific Principles of Plant Protection*, 1940; J. S. Daker, *Simple Greenhouse Management*, 1940; F. Verdoorn (ed.), *Plants and Plant Science*, 1945; G. D. H. Bell, *Cultivated Plants of the Farm*, 1948; F. R. Irvine, *Some Tropical Plants and their uses*, 1948; and P. M. Syngé (ed.), *New Plants of the Year*, 1948, 1949.

Plants, Distribution of, see under GEOGRAPHICAL DISTRIBUTION.

Plants, Flowering, see PHANEROGAMIA.

Plants, Parasitic, see PARASITIC PLANTS.

Planudes, Maximus, see ANTHOLOGY.

Plaquemine, tn. of Louisiana, U.S.A., on the Mississippi R., 85 m. W.N.W. of New Orleans. There is trade in cotton, rice, and sugar, and manufs. of lumber products from cypress wood. Pop. 5000.

Plasma, see under BLOOD.

Plasma, leek-green, feebly translucent variety of chalcidony. It is sometimes dotted with white, but when it contains red spots of iasper it is called 'bloodstone' (q.v.) or 'heliotrope'.

Plasmodium (*plasma*, and Gk. *idos*, form), a large jelly-like mass or protoplasm formed by an aggregation or fusion of amœbas. From the p. are developed fungoid organisms and their spores. It exists specially in myxomycetous fungals. It also denotes a parasitic organism found in the blood of patients with recent malaria, etc.

Plassey, former vil. of Bengal, India, famous as the site of Clive's victory over Suraj-ud-Dowlah, the nawab of Bengal, in June 1757. It is 83 m. N. of Calcutta. By 1801, the battlefield had been submerged by the R. Bhagirathi.

Plaster Casting. The fluid plaster is prepared by sprinkling thoroughly dry plaster into a suitable quantity of water. When it just rises to the surface of the water, it is well stirred, and then has the consistency of cream. The object from which a mould is first made is well vaselined, oiled, or soft-soaped to prevent adhesion of the plaster, which is then laid on uniformly until the cast is about half an inch thick. The plaster sets rapidly, and the mould may be lifted off in about ten minutes. The mould is sized and covered with soft soap and the plaster poured slowly into the mould, the formation of air-bubbles being carefully prevented. A loop of string or wire is pushed into the plaster for suspension when the mould is nearly full.

The mould is chipped away with a hammer and chisel about twelve hours after filling, except in the case of flat casts, which can be easily lifted off. To obtain sev. copies of an object (in other than flat casts) a 'gelatin' mould or a 'piece' mould can be used, which latter consists of sev. parts which can be bound together for the reception of each cast and then lifted off when the cast has set. In this case the plaster is poured into an aperture left for the purpose.

Plaster moulds are also used for the preparation of bronze, lead, and other metal casts. The moulds are made from the clay or plaster model by the same method as is used for plaster casts. The metal in each case is heated until liquid and poured into the plaster moulds in the same way as the plaster. This process is also used for terra-cotta casts, but here the clay may be liquid, or of a consistency of butter, in which case it is pressed into the plaster mould by hand. See J. C. Rich, *The Methods and Materials of Sculpture*, 1918.

Plaster of Paris, $(\text{CaSO}_4)_2\text{H}_2\text{O}$, formed by heating gypsum in kilns at a temp. very little over 130°C . When it is mixed with water the dihydrate is quickly reformed, and a rigid mass is produced thus: $(\text{CaSO}_4)_2\text{H}_2\text{O} + 3\text{H}_2\text{O} = 2(\text{CaSO}_4 \cdot 2\text{H}_2\text{O})$. If in the course of manuf. the water is all removed or the gypsum heated above 130° , the product when mixed with water does not set quickly, and is said to be dead burnt, and the product is useless for making casts. Apparently some P. of P. must contain some unchanged particles of the gypsum, which may act as nuclei, which play the same role as the crystal added to a super-saturated solution, without which crystallisation may be long delayed, or may even fail to take place.

Plastics, by definition, at some stage in their hist. possess plasticity and can be made to flow and take up a desired shape. They may be either natural or synthetic (man-made) in origin, but the latter comprise most P. dealt with by the industry, and it is with these almost exclusively that the term has become associated.

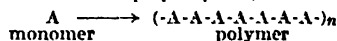
Natural P. were known by the anc. Egyptians and some possess qualities which enable them to maintain their popularity for some purposes, e.g. shellac for gramophone records, bitumen for beer-bottle stoppers, despite strong competition from synthetic resins. Celluloid (q.v.), the pioneer synthetic plastic, was discovered by Alexander Parkes at Birmingham in 1865. It was made from nitro-cellulose, camphor, and alcohol, and first appeared under the name of Parkesine, but is now called Xylonite. Cellulose acetate was discovered in attempts to reduce the dangerous inflammability of celluloid. Casein, long known as the protein of milk, was the second oldest plastic material, having been originally introduced in 1904. Although these materials and many of the reactions upon which the industry is based have long been known to chemists (styrene was first prepared in 1831, acrylic acid in 1843) it was not until 1916, when Bakeloid

produced the first phenol-formaldehyde moulding powder, that the foundations of the modern synthetic P. industry were really laid. As Bakelite this material is world-famous.

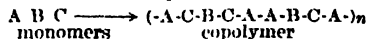
P. fall into two main classes according to their behaviour on heating. Thermoplastics are those which can be repeatedly softened and resoftened by correct heat and pressure treatment, as long as no decomposition or degradation occurs. Thermosetting P. are made permanently rigid by heat, since they undergo an irreversible chemical change. Examples of thermoplastics are most natural waxes and resins, derivatives of cellulose, also synthetic polyethylene, polyvinyl chloride, polymethyl methacrylate, nylon, polystyrene, etc., and their derivatives. The phenolic, amino, and casein P. are thermosetting.

Chemically most P. are composed of carbon combined with various other elements, including hydrogen, oxygen, nitrogen, and chlorine. An interesting and very promising new class is the silicones which have silicon atoms instead of the carbon atoms of other groups, with corresponding differences in properties. In structure P. are composed of many similar units which unite to form exceedingly large, chain-like molecules, which may or may not be branched, and each containing many thousands of units. The length and shape of these chain-molecules determine the behaviour of the finished plastic to some extent, therefore they are carefully controlled during manuf. Studies relating chemical structure with physical properties have revealed much, so that it is possible to predict some of the properties of a new material merely from knowledge of its chemical structure.

The units which make up the large, or macro-molecules may be all of one species, as in the case of polyethylene,



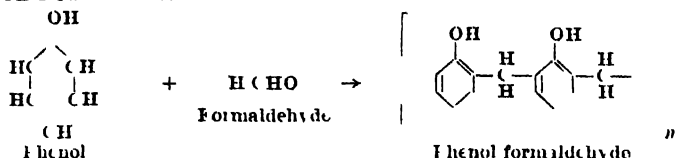
where many ethylene molecules (C_2H_4) join together by simple addition to form long chains of $-\text{CH}_2-$ groups. This addition process is known as polymerisation and the resultant is a polymer. The compound possessing the composition represented by the unit is the monomer—in this case it is ethylene. Where units are of two or more species, e.g. A, B, C, etc., the chains are made up of mixed species, thus:



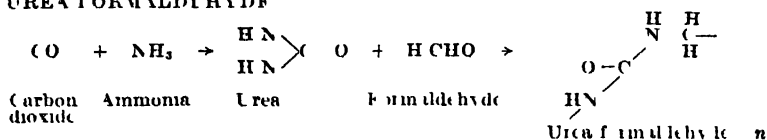
the frequency of the various species being dependent on the proportions of the components in the monomer mixture. This product is a copolymer.

In addition to polymerisation, P. are sometimes formed by condensation reactions. Here simple addition does not occur, but the plastic macromolecule and a small mol. wt. e.g. water, carbon dioxide, alcohol, etc., are formed simultaneously. An example of this type of reaction is the preparation of phenol-formaldehyde resin (see formula 1). Other

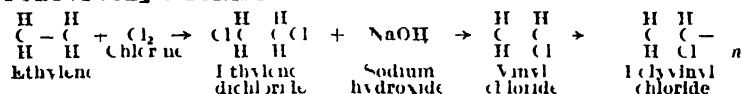
1 PHENOL FORMALDEHYDE



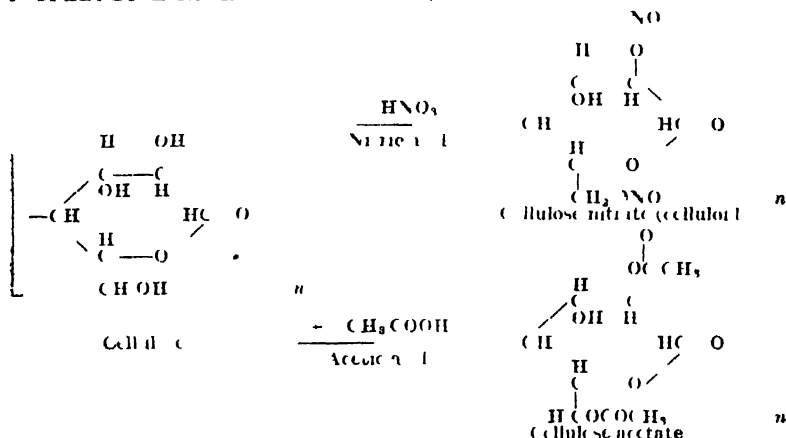
2 UREA FORMALDEHYDE



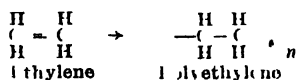
3 POLYVINYL CHLORIDE



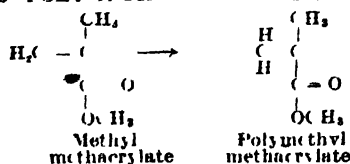
4 CELLULOSE NITRATE (CELLULOSE) AND CELLULOSE ACETATE



5 POLYETHYLENE (POLYETHYLENE)

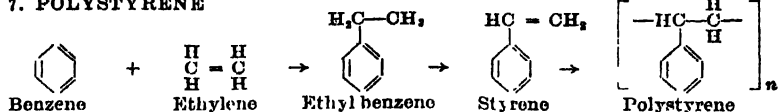


6 POLYMETHYL METHACRYLATE

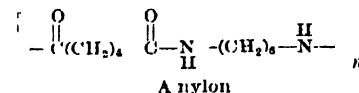


Above and opposite
FORMER OF LIGHT TYPING
OF PLASTICS

7. POLYSTYRENE



8. NYLON



substances than the monomers are present in the polymer-producing reactions. The most important of these is the catalyst, or accelerator, without which the polymerisation would either not take place at all, or would proceed at an uneconomically slow rate. The catalyst is selected according to the reaction it is to promote and may be effective for only one reaction, or for sev.

If moulded articles were made from the unmodified polymer they would be dull and unattractive, as most polymers are white, cream, or similar neutral shades. Dyes and pigments are therefore incorporated into the resins. Other additives include fillers, e.g. fibrous asbestos, cotton linters, etc., which increase the strength of P. which tend to be brittle, or which lower the cost by diluting expensive resins with inexpensive materials, e.g. wood-flour, paper-pulp. Plastic foams may be made by the addition of blowing agents, chemicals which release gas under certain conditions, so producing very light, spongy materials which float easily, e.g. for lifebelts, and which are efficient heat insulators, e.g. for refrigerators. To combat brittleness, particularly in films and articles where flexibility is important, the addition of small amounts of non-volatile solvents, or plasticisers, is necessary.

The methods used in the fabrication of plastic shapes lend themselves to mass production. For this reason they can be sold cheaply, in spite of the many and complicated processes involved in moulding powder manuf. If supplied as moulding powder, the material is in the form of chips or fine granules, which are used for moulding, extruding, or calendaring. Moulds are of two main types, compression moulds in which a known amount of moulding powder is pressed into shape between the hot platens of an hydraulic press, and injection moulds in which heated plastic is injected through a nozzle into a cooled mould. In extruding thermoplastics the resin is heated and in its softened form is forced by a specially designed screw through a heated die, and is then cooled. Casting by pouring into moulds is a simple method which can be used where the polymer can be obtained in a sufficiently fluid state to be poured. It has been used for making gigantic statues in New York in 1939, and is the

usual method for producing sheets, e.g. Perspex. In calendaring powder is fused between carefully spaced, hot rollers from which it is removed as a film or thin sheet. Films are made by extrusion, calendaring, solvent casting or pressing, the particular method being determined by the properties of the plastic employed. Often P. are available as block, sheet, or rod which can be machined, cemented, drilled, sawn, or softened by heat and shaped into any desired final form.

The following are a few individual P. as representative of the main types produced by the industry.

Phenol-formaldehyde (formula 1) is prepared from phenol, or one of its homologues, by condensing it with formaldehyde in the presence of an acid catalyst. It forms a resin, which, if subjected to a short heat-pressure cycle, sets to a hard, infusible, but rather brittle, moulding. The general purpose moulding powder contains wood flour, paper pulp, cotton linters, or asbestos fibres, also colouring matter and other minor constituents. As black or dark colours are usually produced, the applications for which this substance, so well-known as Bakelite, is used are more utilitarian and less decorative than for some other P. Examples are ashtrays, beakers, electric light fittings, telephones, door-knobs, clock and radio cases, etc. In the plywood industry this resin is the adhesive used to bond the wood layers together. Other forms are cold setting adhesives, paint and varnish resins, and casting resins for both decorative and engineering purposes.

Urea-formaldehyde resins (formula 2) are formed by the condensation of aqueous solutions of urea and formaldehyde without the application of external heat. Fillers, e.g. paper pulp or wood flour, are then added. It resembles phenol-formaldehyde resins but has unlimited colour possibilities, although inferior resistance to water. The most important market is for manuf. into decorative articles. Other applications are stoving enamels, laminating agents, and cold setting adhesives.

Casein is the protein of milk, and is derived from it by coagulation with rennet. The precipitated particles are removed, washed with water, air-dried, and ground to fine granules. These are mixed with water, dyes and pigments before being extruded as rod. Casein is thermoplastic and it is treated with formalin, which makes it infusible and increases its water resistance. Casein maintains its popularity because of its infinite colour range and special effects, e.g. imitation horn, shell, mottle, and

metallic finishes, in addition to its cheapness and ease of working, although its water resistance is poor. Casein rods and sheets are available, and are fabricated and finished as buttons chiefly, also toys, radio and electrical parts, knitting needles, buckles, hairslides, etc.

Phenol-formaldehyde, urea-formaldehyde, and casein are all thermosetting materials, as are melamine-formaldehyde, alkyd and allyl and furane resins.

Polyvinyl chloride (formula 3) is formed by the polymerisation of vinyl chloride, a gas, under heat and pressure. The polymer resembles rubber in its properties, is a good electrical insulator, resistant to many chemicals, and non-inflammable. It can be moulded, extruded, and calendered in a wide colour range and in many grades of stiffness, both with and without plasticisers. Its main uses are as wire and cable sheathing, flexible sheeting for curtains, Mackintoshes, belts, and in shoe manuf. Where chemical resistance is important, e.g. petrol hose pipe, chemical plant linings, etc., it finds many applications. Polyvinyl chloride is also used extensively for coating fabrics, e.g. leathercloths.

Cellulose nitrate and cellulose acetate (formula 4) were early discovered polymers derived from wood or cotton linters treated with the appropriate nitric or acetic acid. Cellulose nitrate, or celluloid, was widely used, but its great inflammability was a serious disadvantage and it has been largely replaced by the less inflammable cellulose acetate. As a solution, the latter is used for rayon production, also for lacquers, varnishes, and coating compositions. It is commonly used for moulding every class of article.

Polyethylene (formula 5) is a white, translucent hydrocarbon obtained from ethylene by polymerisation under very high pressure and temp. It is light, tough, and flexible and possesses high resistance to water and chemicals, hence its wide use as a material of construction for the chemical industry for pipes and linings. Its outstanding electrical characteristics, combined with satisfactory mechanical properties, make it pre-eminent in the field of electrical insulation, especially for high frequency and high voltage work. The polymer can be injection and compression moulded, extruded, cast, and sprayed, and it is available in many forms, including powder, sheet, rod, and film.

Polymethyl methacrylate (formula 6) is an organic glass derived from acrylic acid, made from petroleum by a series of complicated processes. Its trade name in Britain is Perspex. It possesses excellent optical clarity, attractive appearance, high mechanical strength, and dimensional stability. It can be obtained as sheet or rod, which can easily be shaped when hot, also as an injection moulding powder. Its chief applications are in the aircraft industry, for surgical instruments where its unusual property of conducting light around corners is utilised, for lighting fittings, brush backs, trays, picnic

ware, toys, etc. It is available in transparent and opaque forms, each in a wide colour range.

Polystyrene (formula 7) closely resembles polymethyl methacrylate and is used for many of the same applications. Methyl methacrylate is preferred in the aircraft industry, and styrene in the electrical industry, where its excellent electrical properties and lower water absorption give it an advantage. Styrene is made from benzene and ethylene, i.e. from coal and petroleum. It is very popular in the U.S.A. owing to its low cost and ease of moulding.

Nylon (formula 8) is the generic term given to long-chain synthetic polyamide resins which have recurring amide groups as an integral part of the main polymer chain. The various nylons are products of the reactions between polybasic acids and poly-functional amines, carried out under carefully controlled conditions of pressure and temp. The main outlet for nylon is as a fibre for spinning and for manuf. into textiles and ropes. In the moulded form it is translucent, ivory-white in its unmodified form, but can be coloured. Mouldings possess toughness, abrasion resistance they can be sterilised in boiling water, so nylon is suitable for domestic and nursery items. Other articles include combs, belts, self-lubricating bearings, valve-seats, packaging film, fishing lines, and brushes for domestic and industrial use. Injection moulding and extrusion are the main methods of processing. (See also NYLON.)

The above P. do not represent a comprehensive list of all those available, but are merely representative of the more important types. New materials are constantly being developed in an ever-widening search for better products.

Even the few examples which have been briefly discussed above serve to show the great diversity of properties and applications existing in the field of P. They may be used to build houses, make furniture, decorate rooms, and for clothing; food may be served in plastic plates on plastic tablecloths, and may have been wrapped in plastic film, or have come from plastic-lined tins and so protected from contamination. P. are used both in work, for telephones, industry's corrosion-resistant pipes and vessels, radar, cables, protective clothing, and in leisure, for fishing lines and tennis racquets (made from nylon gut), billiard balls, table-tennis balls, radio sets, and films.

P. have certain limitations, however, e.g. thermoplastics are scratched easily and are unsuitable for use at temps. above 212° F., though some special types may be exposed to higher temps. without harm. Thermosetting resins tend to be brittle. The most careful consideration is needed therefore in choosing a suitable resin for any particular application. The properties of the plastic must be related to its required performance in order to avoid the use of wrong materials which has been responsible for most of the complaints against plastic products. P. have properties which make them superior to those

materials which they were originally supposed to substitute. They stand on their own merits—they may even be tailor-made to suit special purposes, should it be worth while. The industry is still in its infancy.

See L. M. T. Bell, *The Making and Moulding of Plastics*, 1936; K. Brandenburger, *Processes and Machinery in Plastics Industry*, 1938; H. R. Simonds, *Industrial Plastics*, 1940; D. W. Brown, *Handbook of Engineering Plastics*, 1943; H. Barron, *Modern Plastics*, 1943, 1949; F. H. Lambert, *Moulding of Plastics*, 1948; and J. M. Edwards, *Elementary Plastics*, 1949.

Plastic Surgery, see under SURGERY.

Plata, Rio de la, or River Plate, estuary of the Paraná and Uruguay Rrs., on the E. coast of S. America, discovered by Dias de Solis in 1515. Its total length is estimated at nearly 2300 m., and with its numerous tribs. it drains the whole of Paraguay, most of the Argentine, and large parts of Uruguay, Bolivia, and Brazil. The area of its drainage basin is estimated at about 1,200,000 sq. m. The estuary is shallow (5 to 10 fathoms) and is gradually silting up. It was in the battle of the R. Plata (Dec. 1939) that the Ger. pocket battleship *Admiral Graf Spee* (q.v.) was scuttled by order of Hitler rather than meet the attack of Brit. cruisers.

Plataea, anc. city of Boeotia. At an early period the Plataeans deserted the Boeotian confederacy and placed themselves under the protection of Athens, and when the Persians invaded Attica (490 B.C.) they sent 1000 men to the assistance of the Athenians and fought on their side at the battle of Marathon. Ten years afterwards (480) their city was destroyed by the Persian Army under Xerxes at the instigation of the Thebans, and the place was still in ruins in the following year (479) when the memorable battle was fought in their ter. in which the Persian Mardonius was defeated and the independence of Greece secured. In consequence of this victory, the ter. of P. was declared inviolable. It now enjoyed a prosperity of fifty years, but in the third year of the Peloponnesian war (429) the Thebans persuaded the Spartans to attack the t.n., and after a siege of two years at length succeeded in obtaining possession of the place (127). P. was now razed to the ground, but was again rebuilt after the Peace of Antalcidas (387). It was destroyed the third time by its inveterate enemies, the Thebans, in 374. It was once more restored under the Macedonian supremacy.

Platanus, see PLANE.

Plate-Armour, see under ARMS AND ARMOUR.

Plateau, or Tableland, broad, level area of land in a somewhat elevated position. Two of the most noteworthy Ps. are that in Tibet flanked by the Himalayas and called 'the Roof of the World' and that in the Lake Titicaca dist. of the Peruvian Andes, this latter having an area three times that of England.

Plate-marks, see HALL-MARKS.

Platen, see under PRINTING.

Plating, Electro-, see METALLURGY, ELECTRO-METALLURGY. *Electro-deposition*.

Platinum (Pt; atomic number 78; atomic weight 195.2), metallic element, originally found in gold-mines of Darien, but now obtained from Russia, Brazil, Australia, Tasmania, and S. Africa. It occurs, only native, in grey granules containing gold, copper, or iron, and some of the similar metals such as iridium, rhodium, osmium, etc. Ingots are prepared in two ways: (1) The ore is heated and digested with acids, and then heated with nitric and hydrochloric acids (*aqua regia*) and the dissolved P. precipitated by ammonium chloride; the precipitate is then heated and the P. forms as a spongy mass, or it is fused in lime crucibles. (2) The ore is melted with galena and litharge, and the P. lead alloy formed is decanted, cast into moulds and cupelled, and then fused in the oxy-hydrogen furnace. P. has a blue or greyish white metallic lustre, is very ductile and malleable, with great tenacity; it is very heavy, sp. gr. 21.4, and its melting-point is 1755° C.; it welds at a red heat, its coefficient of expansion is low and allows sealing into glass vessels. This, and the fact that it is unaffected by the atmosphere and resists any single acid, cause it to be largely used in laboratories, and for electrical appliances. It is, however, corroded by chlorine, sulphur, phosphorus, by heating with alkalis, especially with the nitrate and hydroxide of potassium. It forms alloys with most of the metals, and they are more easily fusible, lead and bismuth alloy very readily, while iridium and rhodium alloys are more highly resistant to heat, for which reason they are used in pyrometers. Spongy P., already mentioned, is prepared by heating various of the compounds of P., and is used commercially in the manufacture of sulphuric acid, by virtue of its property of causing heated oxygen and sulphur dioxide to combine on contact; oxygen and hydrogen are also combined, a jet of hydrogen impinging on the sponge, igniting spontaneously. This is used in self-lighting devices for burners, and also in the 'Dobereiner' lamp. P. forms two oxides, sulphides, chloride, the platinumous oxide (PtO), platinumic oxide (PtO₂), etc. Platinum chloride (PtCl₄) is formed by solution in aqua regia and evaporation with chlorine. Hydrochloroplatinic acid (H₂PtCl₆) is obtained from the solution; it is a useful reagent for potassium ammonium, and the amines. Potassium chloroplatinite reduced from the higher salt is used in photography, platinumotype prints having the advantage of complete permanence. Fluorescent screens for X-rays are prepared with barium platinumocyanide.

Platinum-black, finely divided form of platinum, is prepared from platinum chloride by boiling with excess of carbonate of soda and grape sugar, or by adding alcohol to a boiling solution of platinumous chloride and caustic potash. It has the power of occluding and condensing oxygen and hydrogen; it will absorb 100

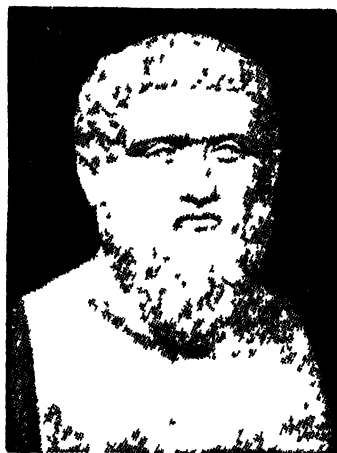
times its own volume of oxygen. *Platinised asbestos* is a deposit of the powder on asbestos used in the manufacture of sulphuric acid, oxygen and sulphur dioxide are combined with the formation of trioxide, from which the acid is formed by solution. *Colloidal platinum* is a suspension of extremely fine particles of platinum in water.

Platinum Resistance Pyrometer, see under PYROMETER

Plato, surname of Aristocles (427-347 B.C.), Gk philosopher b at Athens, his parents being Ariston and Perictione both of noble family. His education was a good one and was directed to the development of the body no less than of the mind for he was a sufficiently good gymnast to contend in the Isthmian and Pythian games. During his youth he wrote verse of various kinds but he later became convinced of the worthlessness of these early efforts and destroyed them. He must have come early to the study of philosophy for it is known that he had studied under Cratylus before he met Socrates at the age of nineteen. It is also probable that he took part in the military proceedings of the latter half of the Peloponnesian war. The setting up of the gov of Thirty at first pleased him for he came of an anti democratic family and felt that wisdom and justice could never flourish in a democracy where matters would be decided largely in accordance with the mood of the moment. But the sad tyranny which ensued led him to withdraw from all connection with the oligarchy. He attached himself to Socrates about 409 and remained with this great teacher till the end of his life rendering him what assistance he could during the latter part of it. On the death of Socrates in 399, P left Athens and went to Megara where he visited Euclid. Thence he passed to Cyrene and thence to Egypt and the Gk colonies in Italy. He returned to Athens in 386 B.C., and numbers of eager students gathered at his house near the Academy, about a mile from Athens in the direction of Eleusis. Here he remained permanently except for three visits to Sicily. The first of these he made on the death of Dionysius I in 386, in the hope of persuading Dionysius II to set up a colony to be ruled according to laws devised by the philosopher. His last journey was made to attempt to bring about a reconciliation between Dionysius and his uncle Dion. He was unsuccessful and barely escaped with his life. During the latter part of his life he enjoyed an honourable position at Athens and his reputation in other parts was also great.

P's works consist of a series of dialogues, in all of which except in the *Lysis*, Socrates is the principal interlocutor. Even from his own time down to the present day, P had been held in high repute as a philosopher, and hence his works have been preserved in excellent condition. After his death the MSS were kept in the school which he had founded. In the time of the succeeding Scholarchs, a complete copy of P's works was placed in the new library at Alexandria by

Demetrius Phalareus. It is almost certain that the 'canon of Thrasyllus' accurately represents the tradition of the Alexandrian library and agrees, so far as it can be investigated, with the list of works attested by Aristophanes. There has been much dispute among modern scholars as to the genuineness of many of these works, recourse having been made entirely to internal evidence. On such grounds various scholars have rejected a greater or less number of the works anciently received; the *Epistles*, in particular being very generally regarded as spurious. Much of the criticism from internal evidence has been guided by the idea that P wished to



PLATO
Vatican

expound a regular system of philosophy. A. Schlegel and others held that the various works could only rightly be understood when viewed as parts of the great scheme which the philosopher had worked out from the beginning. Grote disagrees with this view and it is indeed hardly possible to say that P has any philosophical system of his own. He began by accepting without criticism all the conclusions of Socrates and later he also accepted many of the characteristics of the Pythagorean philosophy. His writings also show that he had a good knowledge of the works of his predecessors. His method seems indeed to be critical and eclectic rather than dogmatical and many of his dialogues are rather reviews of the speculations of former philosophers than formal enunciations of any doctrine of his own. In such works as *Timaeus* and the *Lysis* he is dogmatic, but such dialogues as the *Theaetetus* and the *Hippias Major* show him in a mood frankly sceptical. (Cero indeed says 'Plato affirms nothing, but after producing many

arguments, and examining a question on every side, leaves it undetermined.' In the course of P.'s long career as a philosopher there were indeed few opinions which did not undergo developments or change. At first, for example, he accepted the Socratic identification of virtue and knowledge, which also identifies ignorance and vice. In the *Laws*, however, he also gives incontinence as a cause of vice, and in another place he puts ignorance third among the causes of error, after anger and pleasure. Lewes in his *History of Philosophy* (fifth ed., 1880) thus sums up the question of P.'s development and manner of thought: 'Plato was not waiting in dogmatic impulse, but he was unable patiently to think out a system; and the vacillating lights which shifted constantly before him, the very scepticism which gave such dramatic flexibility to his genius, made him aware that any affirmation he could make was liable to be perplexed by cross lights or would admit of unanswerable objections.'

The philosophic doctrine with which P.'s name is most especially connected is that of Ideas. On the strength of it all Idealists have been ready to attribute their theories to the Gk. philosopher, and much confusion has been introduced. P.'s doctrine is an attempt to combine two opposing views. The disciples of Heraclitus taught that all things were in a perpetual flux, a doctrine that was modified by Protagoras into the dogma, *πάντων μετὰ αἰσθησιν*, 'the individual man is the measure of all things.' On the other hand, there was the Eleatic doctrine that all is one, and that there is no multiplicity, that this one is immutable, and that there is no change. These views were combined by P. by his differentiation of the real and the sensible. In a famous passage in the *Republic* he likens the human race to men who are prisoners in a cave beneath the ground, chained, with their backs towards a fire, gazing at the shadows on the wall and mistaking them for realities. The education of the philosopher is represented by the tortuous struggle of some of these prisoners to reach the outer world and the clear light of the sun. According, then, to the Platonic doctrine, the things which we perceive, the objects of the sensible world, are not the objects of philosophical reasoning. But all these sensible objects have some feature in common. For example, from our personal knowledge we can have cognisance only of individual men, yet we have an abstract conception of Man. We see numbers of trees, yet we must have an abstract conception of the nature of a tree to enable us to describe so many varying things by the same term. To these general terms, the abstract conceptions of visible objects, P. gave a real existence; in the words of Aristotle: 'Those intelligible Essences he called Ideas; adding that sensible objects were different from Ideas and received from them their names; for it is in consequence of their participation (*μετά μετέω*) in Ideas that all objects of the same genus receive the same name as the Ideas.' P.'s theory of Ideas,

however, had a lasting effect upon W. culture. Through the neo-Platonists it dominated all philosophical and theological thought until the scholastics founded their doctrine on the system of Aristotle. Further, the purely metaphysical theory involved the physical theory of natural kinds; but the two theories were not inseparable. Spinoza and Aristotle both firmly rejected the metaphysical theory, though it had provided a basis for their classifications in zoology and botany.

The works of P. are arranged by Schleiermacher in three classes: (1) Elementary dialogues, or those which contain the germ of all that follows, of logic as the instrument of philosophy and of Ideas as its proper object; consequently of the possibility of the conditions of knowledge. This group comprises the *Phaedrus*, *Lysis*, *Protagoras*, *Laches*, *Charmides*, *Euthyphro*, and *Parmenides*, to which he subjoins as an appendix the *Apology*, *Crito*, *Ion*, *Hippias Minor*, *Hipparchus*, *Meno*, and *Alcibiades II.* (2) Progressive dialogues, which treat of the distinction between philosophical and common knowledge in their united application to the two proposed and real sciences, Ethics and Physics; these are the *Gorgias*, *Theaetetus*, *Meno*, *Euthydemus*, *Cratylus*, *Sophist*, *Statesman*, *Symposium*, *Phaedo*, and *Philebus*, with an appendix containing the *Theages*, *Erasia*, *Alcibiades I.*, *Meneceus*, *Hippias Major*, and *Clitophon*. (3) Constructive dialogues, in which the practical is completely united with the speculative; these are the *Republic*, *Timaeus*, and *Critias*, with an appendix containing the *Laws* and the *Epistles*. Many criticisms have been directed against this arrangement, and Grote's criticism of the whole hypothesis of Schleiermacher has already been quoted. Others would accept the simpler div. of them into dogmatic and polemical, proposed by Sextus Empiricus.

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Platoon (Fr. *peloton*), in the Brit. Army signifies the sub-units into which a company of infantry is divided; in the U.S. Army it means also a similar sub-unit of cavalry and of some other arms. In origin the P. was the fire-unit of infantry, and the tactics of the eighteenth century, and hence the ceremonial drill of to-day, are based on 'P. firing.' The Brit. Army infantry P. is commanded by a subaltern who is assisted by a sergeant; it is divided into three light machine-gun sections, each about seven men strong, and commanded by a corporal, and a headquarters section comprising the 2-in. mortar and P.I.A.T. teams (two men each), a signaller, a runner, and an orderly: total strength about thirty all ranks.

Platt-Deutsch, see GERMANY, *Language and Literature*.

Platte, or **Nebraska**, affluent of the Missouri R., U.S.A., rising in the Rocky Mts., Colorado, and flowing through Nebraska, entering the Missouri a little above Plattsmouth. Its total length, including both N. and S. forks, is 825 m. The depth of water is insufficient for navigation. The P. encloses many is., and in the summertime a large portion of the riv.-bed is dry. It drains some 90,000 sq. m.

Plattsburg: 1. Co. seat of Clinton co., New York, U.S.A., at the mouth of the Saranac R., and 140 m. N.E. of Albany. It has a commodious harbour and extensive water-power, and among its industries are flour and saw mills, pulp and paper factories, etc. It is an important military station and possesses some of the largest barracks in New York. Pop. 16,300. 2. Tn. of Northumberland co., New S. Wales, 70 m. N. of Sydney. It has coal-mines. Pop. 3793.

Plattsmouth, co. seat of Cass co., Nebraska, U.S.A., on the Missouri, near its junction with the Platte R., 20 m. S. of Omaha. It is engaged in the building of railway wagons and engines. Pop. 4300.

Platyhelminthes, or **Flat Worms**, lowest and simplest phylum of the worm-like animals. They are practically all herminaphrodite, and include some of the most important internal parasites, such as tape worms and the liver fluke. They are divided into three classes, of which one, Turbellaria, is non-parasitic (see PLANARIAN). The others are Cestoda and

Trematoda. The former contains the tape worms, which in the adult forms have long, flattened, ribbon-like segmented bodies, and a 'head,' or scolex, usually provided with hooks and suckers. They have no mouth and no digestive canal, absorbing nourishment by the whole surface of the body. Besides numerous Cestode parasites of mammals and birds, some are parasites of fishes. The Trematodes have non-segmented, flattened, oval, or lanceolate bodies, with a mouth and digestive canal. The most harmful parasite of this class is *Distoma hepaticum*, the liver fluke (q.v.). See PARASITES; TAPE WORMS.

Platypus, Duck-billed, see DUCK-BILLED PLATYPUS.

Plauen, tn. of Saxony, cap. of the Vogtland dist., on the Elster, 61 m. S.W. of Leipzig; it has manufs. of embroidery, lace, cotton goods, muslin, cambric, engineering, and radio goods, etc., and is an important railway junction. Pop. 110,000.

Plautus, **Titus Maccius** (c. 251-184 B.C.), Rom. dramatist and comic poet, b. at Sarsina in Umbria. In early life he was very poor, and entered the service of a baker for a time. He began writing plays (c. 223) before the second Punic war (218-201). P. adapted material taken from the new Attic comedy, but unlike Terence, who became famous considerably later, he made his characters utterly Rom. in nature, if not in name. About twenty genuine comedies are extant, including the *Amphitruo*, *Captivi*, *Rudens*, *Aulularia*, *Trinummus*, *Mosellaria*, *Menæchmi*, and *Miles gloriosus*. The titles are usually derived from a leading character or incident, or from an adjective giving a general description of the play. Dryden, Addison, Lessing, and others imitated P.; Molière used some of his plots, as in *L'Émule* (from the *Aulularia*), and Shakespeare based his *Comedy of Errors* on the *Menæchmi*. His style is lively and energetic, and his works were deservedly popular with the Romans, and maintained their reputation to modern times. There are complete Eng. trans. by R. Thornton (1764-74) and H. T. Riley (1880). Among the best eds. are those of F. W. Ritschl (c. 1849-78), J. L. Using (1875-86), G. Lowe, G. Gortz, and F. Schoell (1878-94); F. Leo (1885-96); P. Nixon (1938, Loeb); and various annotated eds. of separate plays including N. Moseley and M. Hammond, *Menæchmi* (1933). See Varro, *Questiones Plautinae*; K. A. Sonnenschein, *Bentley's Plautine Emendations*, 1883; P. Langen, *Plautinische Studien*, 1886; F. Leo, *Plautinische Forschungen*, 1895; J. W. Duff, *Literary History of Rome*, 1909; and G. Michaut, *Plaute*, 1920.

Play, **Pierre Guillaume Frédéric Le**, see LE PLAY.

Player-Piano. The first automatic P.-P. was invented in 1842. In 1860 a patent was taken out for a keyboard piano player, and the first pneumatic keyboard instrument was made in France three years later. Since then great improvements have in the technique of construction have

led to the modern instrument in which it is not only possible for the operator to control any performance to suit his own tastes, but also to reproduce the recordings of famous players quite automatically. The P.-P. is a piano in which the music is played by propelling a perforated 'music roll' through the piano. Corresponding to each note on the instrument there is a narrow tube whose aperture is uncovered when a perforation passes over it. Such a tube communicated directly with a chamber in which the air is at a pressure below that of the atmosphere; the uncovering of the aperture allows atmospheric air to rush into this chamber and set in operation a system of levers that causes the hammer to strike the note in question. In pedal instruments the roll is propelled by means of a pneumatic motor that also pumps air out of the control chambers. Silent electric motors are fitted to modern P.-P.s. to relieve the operator of the necessity of driving the pedals, thus leaving him free to concentrate on his performance. The tempo of any composition is under the control of the operator who can regulate the speed at which the roll moves by means of a lever that is coupled to the 'governor' of the motor. In addition to this lever there are others that control the blow struck by the hammer so as to enable the expression to be changed. The Eolian and Orchestral organs work on the same principle as the P.-P.

Playfair, John (1748-1819), Scottish geologist and mathematician, b. at Benzie, near Dundee. In 1785 he became prof. of mathematics at Edinburgh Univ., and in 1805 was transferred to the chair of natural philosophy there. Elected a member of the Royal Society in 1807, he wrote *Elements of Geometry* (1812-14); *Outlines of Natural Philosophy* (1812-16); and *Illustrations of the Newtonian Theory of the Earth* (1802). See memoir by F. Jeffrey in *The Works of John Playfair*, ed. by J. G. Playfair, 1822.

Playfair, Sir Nigel (1874-1931), Eng. actor-manager, b. in London; son of Wm. S. Playfair, M.D. Educated at Winchester, Harrow, and Univ. College, Oxford, he was called to the Bar (Inner Temple) in 1900 and practised for a time. Gaining dramatic experience with the Oxford University Dramatic Society, the Old Stagers, and the Windsor Strollers, he made his professional debut at the Garrick Theatre in 1902. In 1918 P. assumed the management of the Lyric Theatre, Hammersmith, famous for its revival of old plays. He wrote *The Story of the Lyric Theatre* (1925) and *Hammersmith Hoy* (1930).

Playing-Cards, see CARDS.

Playing Fields Association, National, see NATIONAL.

Plays, see CENSORSHIP OF THE DRAMA; DRAMA; RADIO DRAMA; THEATRE.

Plea, in law, a term used to denote either generally (1) an action or criminal prosecution, or specifically (2) that which is pleaded or alleged by a party to an action or defendant in criminal proceedings in

answer to the allegation of the other party or of the prosecution. In a third sense P. was the technical term before the Jurisdiction Act, 1875, for what is now called in the language of civil pleadings a *defence*. As to (1): This use is now obsolete. The old commentators, like Blackstone and Stephen, regularly divided P.s. into P.s. of the Crown, i.e. crimes in respect of which the Crown proceeded on behalf of the public in the king's bench court, and common P.s., or actions between subject and subject tried in the court of common pleas (*q.v.*). As to (2): Allegations in pleadings (*q.v.*) are either substantial, that is, go to the merits of the cause of action, or are merely dilatory, that is, offer some merely formal objection to the proceedings. Dilatory P.s. are now either obsolete or superseded by interlocutory proceedings. Substantial P.s. in civil actions are generally classified into: (1) Traverse (*q.v.*); (2) Confession and avoidance (*q.v.*); and (3) Objections in point of law. In criminal procedure P.s. are either: (a) Dilatory (to the jurisdiction and in abatement); these are seldom resorted to at the present day, for relief can be obtained in other ways, such as by writ of error or motion in arrest of judgment, or, again, the court will cause the indictment to be amended. (b) Special P.s. in bar: (1) *Autofusus acquit*, i.e. a plea that the accused has already been acquitted of the charge; (2) *Autofusus convict*, a P. of former conviction on the same charge; (3) P. of pardon by the Crown. (c) The general P. of not guilty.

Pleadings, written or printed statements of the parties to an action which have for their object the arrival, by the process of eliminating all immaterial or admitted allegations, at the actual point or points in issue. According to legal historians, the method of arriving at an issue by alternate allegations was practised in England as long ago as the reign of Henry II. But it has taken centuries to free the science of P. from those really technical embarrassments which put a litigant out of court for the very smallest technical flaw. Formerly P. were oral, and the parties, either by themselves or a professional pleader, conducted a *viva voce* altercation in the presence of a judge whose duty it was to superintend this oral contention and to compel the pleaders so to frame their alternate allegations as at last to come upon some one specific matter or matters upon which they were really at variance, and which they could both agree constituted the real question requiring decision. This result attained, the parties were said to be *at issue*, and they were ready to go before a jury or judge on the question of fact or law, whichever it happened to be. Thus the question for decision came to be called the issue. The evolution of written or printed P. is curious: in the early days the 'parol altercation' of the pleaders was recorded officially on a 'recognition roll' (i.e. the record of the court). Later each pleader borrowed the roll in turn and himself entered his allegation and counter-allegation on it; still later they were

drawn up on paper and interchanged, and when an issue was finally arrived at the P. were entered on the parchment roll. In the days when the old forms of action, e.g. *detinue* (q.v.), case (see *CASE*), *action upon the*, trespass (q.v.), conversion (q.v.), were sacred to the heart of the lawyer, the spirit and substance of the allegations in the P. were entirely subordinated to technical requirements of form. The Common Law Procedure Acts, 1852-60, effected considerable reforms in this matter, but it was not until the Judicature Act, 1873, was passed that the straightforward commonsense manner of pleading now in vogue was introduced into the high court. See E. Bullen and S. M. Leake, *Precedents of Pleadings*, 1860, 1948.

Pleasure, see *EMOTIONS*; *THINGS*; *FEELING*; *HI DONISM*.

Plebeians, Plebs, or Plebes, commonalty of auct. Rome, including all citizens not belonging to the patrician *gentes*. They were originally mainly derived from the conquered Latins, settled on Rom. ter. Servius Tullius first made them serve in war and granted them the right of voting in the *Comitia Centuriata* with the patricians. Mommsen considers that the P. were simply the *clientes* (dependents), looked at as being deprived of political rights. Under the republic, between c. 510 and 286 B.C., the long struggle for equality of rights between P. and patricians continued. It was marked by the estab. of *tribuni plebis* (491 or 493), and gradually the P. gained admission to all the chief secular and religious offices of state. The name later was associated with the lower ranks of the people, as opposed to the *nobles*, holders of office, and hence was used for popular or mob. See Mommsen, *Römische Forschungen*, 1.; *Römische Staatsrecht*, II.

Plebiscite (*plebiscitum*), ordinance, decree, in auct. Rom. hist., a law enacted by the plebs in their *comitia tributa* or *concilia plebis* (estab. 449 B.C.) on the rogation of a tribune (first created 491 or 493). Originally these resolutions needed confirmation by the senate, but later they came to be binding on the whole nation (*universus populus*), as finally stated in the *Lex Hortensia* (286 B.C.). In modern politics a P. is an expression of popular opinion obtained by vote from all the electors of the state. In Great Britain the principle of the P., which is often confused with referendum (q.v.), is sometimes applied by local authorities over questions of local interest such as rating, etc. In the national sense, however, P.s. have been employed by the League of Nations under a section of the treaty of Versailles to decide the national destiny of areas which were involved in peculiar difficulties. P.s. were held and decisions resulting from them made in regard to Allenstein Marienwerder, the Burgenland, and Klagenfurt. In 1935 a P. took place in the Saar dist. to discover the wishes of the inhab. regarding their nationality, and, under the growing influence of National Socialism, it resulted overwhelmingly in favour of Ger. as against

Fr. nationality. A P. in Schleswig resulted in the div. of that area between Denmark and Germany. Another important P. was that of Upper Silesia in 1921, which, though conforming to the individuality of the ter., yet involved its partition between Germany and Poland, and by transferring a racial minority of Ger. Poles to the new Polish republic, sowed the seeds of future bloodshed. The actual result of the vote on that occasion was 707,000 for Germany and 479,000 for Poland, but the indignation from the dissatisfied minority led to the League of Nations ruling as to the partition. On Oct. 12, 1939, the Soviet Gov. held a P. in the E. provs. of Poland, in order that the inhab. might actually or apparently decide on the question of annexation (see under *POLAND*). A P. was held in 1946 in Greece, and a majority of more than two to one obtained for the king's return. See S. Wambaugh, *A Monograph on Plebiscites*, 1920, *Plebiscites since the World War*, 1933, and *The Saar Plebiscite*, 1940, and J. A. Gawenda, *Le Plebiscite en droit international*, 1946.

Plectognathii, see *BONY FISHES*.

Pledge, see under *PAWNBROKER*.

Pleiade, name applied to a group of seven Fr. poets of the sixteenth century, who united to reduce Fr. literature and language to a classical form. They were Ronsard, Du Bellay, Baif, Jodelle, Thivard, Dorat and Belcau. See G. Wingham, *Ronsard and La Pleiade*, 1906.

Pleiades, in classic mythology, the seven daughters of Atlas and Pleione, 6 on the Arcadian Mt. Cyllene. Their names, Alcyon, Electra, Merope, Maia, Taygeta, Celaeno, and Asterope, with those of their parents, have been applied since Illeddolo (1665) to the nine brightest stars of the group in Taurus. There were various legends to account for their being turned into stars. They rise in May (the approach of harvest) and set in Oct. (the time for new sowing), marking the season of navigation. They are sometimes known as Vergilae or Atlantides.

Pleiades, the most famous star cluster and known to man from the earliest times; the writer of the book of Job refers to the Pleiades in ch. 38, v. 31. This group of stars, which begins to appear above the horizon in the late evenings of autumn, forms a good test for the eyesight. Normal eyesight can detect six but those endowed with keen sight can see seven or even more. A small telescope or a pair of binoculars shows many more, and the astronomer's photographic plate has revealed thousands. The brightest star in the cluster— α Tauri, also known as Alcyon—is a quadruple and is a beautiful object when viewed through even a small telescope. The group has a number of nebulae and is surrounded by a fine nebulous mass, extending out a considerable distance.

Pleioocene, see *PLEIOGENE*.

Pleistocene Period, see *GLACIAL OR PLIOSTOCENE PERIOD*.

Plenipotentiary, or Envoy Extraordinary, person accredited to some foreign sovereign who is invested with unlimited

power to negotiate a treaty or transact any other diplomatic business. It is usual for the sovereign powers who are parties to a treaty to ratify the treaty, even though signed by a P.

Plesiosaurus (Gk πλεσιον, near, σαυρος, lizard) chief genus of the extinct family Plesiosauridae. The species were sea reptiles with paddle shaped limbs adapted

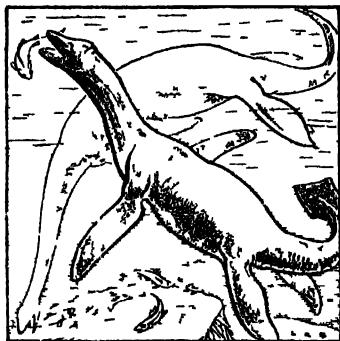


FIG 108a ALA

for swimming a very long neck containing from twenty eight to forty vertebrae, a smallish head, and a short tail with from thirty to forty vertebrae. Fossil species have been found in the lias of England and Germany.

Pleskov, see Pleskov.

Pleurisy, inflammation of the *pleura*, the serous membrane enveloping the lung. Each of the pleurae has a visceral and a parietal layer between which is a closed space known as the pleural cavity. In health the two layers are usually in fairly close contact sliding over each other during the movements of respiration. When the pleura is inflamed through invasion by microorganisms, an exudation takes place which is accompanied by a varying amount of disturbance of the respiratory function and general febrile conditions. The exudation may be fibrinous, consisting of coagulated fibrin, epithelial cells, and blood corpuscles. In this case the surfaces of the membranes are roughened, and pass over each other with a certain amount of friction which can be detected by the ear. This is the common form known as dry P., and may result in the adhesion of parts of the two surfaces or may proceed to serous effusion. The effusion of fluid into the cavity may continue until as much as a gallon is included between the layers. The pleural sac is therefore distended, breathing and other functions are interfered with, and there is a characteristic painful dry cough. The fluid may gradually be absorbed, when the pleural layers may become united by adhesion or recover their normal condition, or the inflammation may become chronic and recurrent. In some cases the unabsorbed fluid becomes purulent, occasioning the condition known

as *empyema*. The symptoms of P. include rigors, fever, and pain in the side in the early stage, in diaphragmatic P. the pain may be referred to the shoulder or to the abdomen. Later on the existence of fibrinous exudation can be detected by the grating sounds, or the presence of an amount of fluid shown by a dull sound on percussion. Breathing is laboured or incomplete and is accompanied by a dry cough. With increase in the amount of fluid the difficulty of expanding the lung becomes greater, and a certain degree of dyspnoea results. P. should be treated by rest, light diet and attention to febrile symptoms in the early stages. Pain may be relieved by an injection of morphia hypodermically. If the accumulation of fluid does not become readily absorbed, it is usual to puncture the chest and draw off the fluid with an aspirator. In most cases this operation is followed by relief from the distressing symptoms and a cessation of the inflammatory process. P. particularly when accompanied by effusion, is a serious disease and may lead to pulmonary tuberculosis (or be caused by it) so that adequate and careful convalescence (three to six months) is most important. Chest exercises are useful. See J. Maxwell *Introduction to Diseases of the Chest* (3rd ed.) 1918.

Pleurisy Root, see BUTIRITA WIEN.

Pleuronectidae, see PLATYPSID.

Pleuro-pneumonia, combined inflammation of the pleura and of the lung. *Pleurisy* complicated by *pneumonia*. The term is particularly applied to a contagious disease peculiar to cattle, and popularly known as *lung plague*. It first made its appearance in Central Europe, but the earliest definite description of it occurs in 1764, when it was known in Franche Comté under the name of *muette*. Various microorganisms have been found associated with the disease. The disease is of epidemic character and spreads rapidly where bad sanitation exists. The symptoms are fever, loss of appetite, quickened breathing, and cough. The animal rapidly loses flesh, and usually dies in an emaciated condition after three to eight weeks. Inoculation with lymph extracted from a diseased animal has been practised and appears to render cattle practically immune from the disease.

Plevna or **Pleven**, district in N. of Bulgaria near the Vid, 24 m. from Nikopol. After aillant defence the heroic Turkish leader Osman Pasha was forced to yield to the Russians and Rumians (1877). Area of dist. 2980 sq. m. Pop. 1,056,400. Pop. of tn. 39,000.

Pleyel, or **Pleyl**, Ignaz Joseph (1757-1831) Austrian musical composer & b. at Rupers-dorf, favourite pupil of Haydn. He was musical director of Strassburg cathedral (1783), conducted concerts in London (1792), and settled in Paris (1796), founding a pianoforte manufactory there (1807) under the firm of P., Wolff & Co. His son Joseph Etienne (Amille) became his partner in a 1st P. pub. the *Bibliothèque Musicale*, and wrote the opera *Iduna in Aulide*, and many instrumental pieces.

Plimsoll, Samuel (1824-98), Eng. politician, *b.* at Bristol. He entered Parliament in 1868, and became known for his interest in the sailors of the mercantile marine. One of his objects was to protect the lives of sailors by enforcing a compulsory load-line. To secure this end he devoted all his energies, and finally secured the passing of the Merchant Shipping Act in 1876. The compulsory load-line (*q.r.*) is now generally known as the P. line.

Plinlimmon, see **PLYNIMMON**.

Plinth (πλινθος, tile, brick), in architecture the lower square member of the base of a column or pedestal; or a block of stone used as a base or pedestal for a statue, bust, or vase, or the square base of a piece of furniture. The form is also applied to the projecting part of a wall immediately above the ground, two or more rows of bricks at the base.

Pliny the Elder (Gaius Plinius Secundus) (A.D. 23-79), Rom. writer of natural hist., *b.* at Novum Comum (Como). He served in Africa, commanded a cavalry troop in Germany (46), and returned to Rome (52). His scientific studies, pursued throughout his life, and especially between 55 and 68, won him fame as the most learned man of his age. P. was procurator in Spain (c. 68-72), held high office under Vespasian, and was commander of the fleet at Misenum under Titus. His zeal for research led to his death by suffocation in the eruption of Vesuvius (79). Of all his writings (hist. of the Germanic wars, of his own time, works on tactics, rhetoric, grammar, etc.) only the *Naturalis historia* remains, an encyclopaedic work on science, art, natural hist., and allied subjects, with digressions on human inventions and institutions. The style varies, but is vigorous if sometimes obscure through brevity. Good eds. are those of C. J. Sillig (1853-55); D. Diefen (1866-82); *The Elder Pliny's Chapters on the History of Art*, trans. by K. Jex-Blake and with notes by E. Sellers, 1896; Fr. trans. by A. de Grandagne, 1829-33; J. Bostock and H. T. Riley, Eng. trans. in Bohn's Library, 1855-57. See A. Wannowski, *Pliniana*, 1847; L. Ulrichs, *Chrestomathia Pliniana*, 1857; A. Fels, *De Codicibus Pliniaris*, 1861; J. Müller, *Der Stil des alten Pliny*, 1883; D. Diefen, *Quellen*, 1904, 1908; and Pliny the Younger, *Epist.* iii and vi. See also J. O. Thomson, *History of Ancient Geography*, 1948.

Pliny the Younger (Gaius Plinius Caecilius Secundus) (A.D. 62-c. 114), Rom. orator and author, nephew and adopted son of P. the Elder, *b.* at Novum Comum (Como). He became an advocate (80), senator (c. 81), military tribune in Syria (c. 82), and after holding other high offices was finally consul under Trajan (100), and governor of Bithynia (111). P. was an intimate friend of Trajan and Tacitus, and studied rhetoric under Quintilian. His remaining works include the nine books of *Letters*, with a tenth containing his correspondence with Trajan, including the famous letter about the treatment of the Christians in his prov., and *Panegyric*

on Trajan. For eds. see those of G. E. Gierig, with notes (1796-1800); H. Keil and T. Mommsen (1870-71); and C. F. W. Müller (1903). The *Epistles* have been ed. by G. Korte (1734), and separate books by J. Cowan (1889) and J. D. Duff (1906). See also E. T. Merrill, *Selected Letters* (1903). J. D. Lewis, Eng. trans. 1879, is good. See Cellarius, *Vita*, c. 1693; J. Masson, 1709; M. Schanz, *Roman Literature*, 1890-1906; and E. G. Hardy, *Studies in Roman History*, 1906-09.

Pliocene, or **Pleocene**, name given to the topmost div. of the Tertiary system in geology. Strata of this age cover a large area in Norfolk, Suffolk, and occur also in a number of small areas, chiefly about Walton-on-the-Naze, in Essex, where they rest unconformably on the London Clay and Chalk. The beds are termed 'crags' from their 'shelly' nature, being typically marine shell-banks, deposited in shallow water near the shore, and indicating that this area underwent subsidence during P. time. The older P. had probably a warm temperate climate, and is represented by the Coralline Crag; the newer P. was probably cold temperate, and is represented by the Red, Norwich, Chillesford, and Weybourne Crags, the Forest Bed group, and *Leda myalis* beds. Arctic conditions prevailed at the close of P. time. The Coralline Crag, so called from the large number of contained Polyzoa (Corallines), consists of calcareous sands, occurs near Orford in Suffolk, and is 60-80 ft. thick. At its base occurs a conglomerate deposit with 'box-stones' and phosphate beds, containing early P. fossils. The fossils of the Coralline Crag are chiefly Polyzoa (*Lioporella*, etc.), Lamellibranchs (*Astarte* and *Pecten*), Brachiopods, Gastropods, and over a hundred species of Foraminifera. The Red Crag consists of red ferruginous sands, and covers an area of 300-400 sq. m., but is usually concealed by the glacial gravels and sands. The fossils are chiefly Mollusca (*Erusus*, *Astarte*, *Pectunculus*), 273 species being known, of which 33 are extinct. The Norwich or Mammalian Crag has a wider distribution than any other P. formation. It ranges from the coast of Norfolk to Orwell in Suffolk (70 m.), and varies in thickness from 30 to 130 ft. Fossils such as *Aucula* and *Tellina* occur in these shelly sands of the Crag, and mammalian remains are common and include *Mastodon*, *Elephas antiquus*, *Felis*, *Ursus*, *Bos*, etc. Resting on the Red and Norwich Crags is the Chillesford Crag, which shows many shells of Arctic species (*Cardium*). The Chillesford Clay then follows, and this is succeeded by the Weybourne Crag with a still larger proportion of N. forms (*Astarte*, *Borealis*, etc.). The Forest Bed group which succeeds consists of fresh-water and estuarine strata, and contains the 'Cromer Forest Bed,' which is about 20 ft. thick. This bed is formed of clays, lignite, etc., rich in plant remains and stumps of trees (maple, sycamore, oak, beech, etc.), and bones of mammalia (hippotamuses, elephant, and beaver). The terminal member of the Brit. P. is the *Leda myalis* bed, formed

of 20 ft. of marine sands and gravels, with *Leda myalis*, *Mya truncata*, etc. The P. of Belgium (*Diestian*) is arenaceous, and corresponds to Lenham beds (so called from solution 'pipes' exposed in chalk quarries on the escarpment of the N. Downs, particularly at Lenham, Kent), of the older P. In Britain, chipped flints (eoliths) have been recovered from Late Pliocene deposits. The Suffolk Bore Beds and other crag deposits in E. Anglia are well-known for the scrapers and beak-shaped tools which they yield, and certain levels can be recognised as old land surfaces. Most archaeologists now accept that man in Late Pliocene times lived on these surfaces and on the edge of the Crag sea, subsisting on shell-fish and other simple foods. In Italy the P. becomes a marine formation, covering a large area of the sub-Apeninines and the Is. of Sicily, and consists of clays, marls, and thick limestones. The Alps received their final elevation, and a host of volcanoes broke out along the S. borders of the Alpine regions (Etna, Somma, Santorin, etc.). In India P. strata of fluvatile origin (Siwalik beds) are found in the Himalayas, and are characterised by mammalian remains. The P. of N. America (Colorado, Kansas) is remarkable for the oriental character of the fauna.

Pliosaurus or **Pleiosaurus** (Gk. πλειος, larger, τειρος, lizard), genus of extinct reptiles with fin-like paddles and a large head supported on a short neck. Remains have been found in the Jurassic rocks of England and elsewhere.

Plock, or **Plotzk**: 1. Dist. of Poland, bounded N.W. and N. by Germany, S. by Warsaw, S.W. by the Vistula. The surface is rather flat and marshy, area about 3641 sq. m., with forests and peat-bogs N. and W. There are distilleries, sugar-refineries, saw and flour mills, iron and wood manufs., and tanneries. Grain and agric. implements are also produced. Pop. 786,000. 2. Cap. of the above, on the Vistula. 58 m. W.N.W. of Warsaw. In the Middle Ages the dukes of Masovia resided here. It is a bishop's see, and has a twelfth-century cathedral, with tombs of the Polish sovereigns Vladislas I. (d. 1102) and Boleslas III. (d. 1139). There is also an old Piarist college. P. was captured by the Gers. in Nov. 1914 and again in 1939. There is trade in sugar-beet, timber, and grain, and manufs. of agric. machinery, soap, etc. Pop. 32,700 (in 1931).

Ploegsteert, vill. in W. Flanders, Belgium, 8 m. S. of Ypres, known as 'Plog Street' to Brit. troops; the vill. and its nearby wood were an important position in the battles of the Ypres salient in the First World War. Over 11,000 missing are commemorated by a memorial.

Ploesti, **Ploiesti**, or **Ploesni**, cap. of Prahova prov., Rumania, 35 m. N. of Bucharest. There are petroleum wells and refineries in the vicinity, it has trade in wool, and is a road and rail junction. The Rumanian oilfields at P. were of vital importance to Germany during the Second World War and were therefore heavily bombed by the Allies: 177

Amer. Liberator planes made a low-level daylight attack on Aug. 12, 1943, the raid involving a flight of 2480 m. Pop. 77,000.

Plombières, tn. in the dept. of Vosges, France, 14 m. S. of Epinal. It is a popular watering-place, with many medicinal springs, whose curative properties bring relief to thousands of patients annually. The Romans have left traces of their occupation in their well-preserved baths. It was here that Cavour signed the celebrated 'Paix de Plombières' with Napoleon III. (1859), which provided for the cession of Savoy and Nice to France. Pop. 1700.

Plotinus, see under **PHILOSOPHY**.
Plotinus (c. 203-c. 262), Gk. philosopher, founder of Neoplatonism, b. at Lycopolis in Egypt. At the age of twenty-eight he began to attend the lectures of Ammonius Saccas, the chief forerunner of the Neoplatonists. In 212 he went with the Emperor Gordian to Mesopotamia and the E., whence two years later he returned to Rome. Here he taught philosophy for ten years, enjoying the admiration and favour of the Emperor Gallienus. About 262 he retired to Campania, where he died. His works were ed. by his disciple Porphyry in six groups, each containing nine books, and hence known as the *Enneads*. A Lat. trans. was pub. in 1492. P. is an idealist pure and simple. God is spirit, and all that can be attributed to him is goodness and unity. From him emanates Intellect (*Nous*), from the *Nous* comes the world-soul, from which emanate various forces (including the human soul), whence finally comes Matter. Man's work is to return to union with God by eliminating from his life the unreal and material, and the final step in this union is that of ecstasy. See **NEOPLATONISM**. See Eng. trans. by S. MacKenna, 1917; also W. R. Inge, *The Religious Philosophy of Plotinus*, 1914, and *The Philosophy of Plotinus* (3rd ed.), 1925.

Plotzk, see **PLOCK**.

Plougastel-Daoulas, tn. of the dept. of Finistere, France, on a peninsula of the Brest coast. The tn. was damaged in the Second World War, the church being almost entirely destroyed, and the fine seventeenth-century Calvary heavily pitted. Pop. 6914.

Plough (Plow) Monday, or **Hook Monday**, first Monday after Epiphany (Twelfth Day), termination of the Christmas holidays, and herald of the ploughing season. The anct. custom of celebrating it by a procession and drawing a plough from door to door in the par. and begging 'plough-money' for rustic festivities still survives in parts of England.

Ploughs and Ploughing. From a remote period the plough has been the most important implement of husbandry, but only since the middle of the seventeenth century has any advance been made on some of the oldest types which are still to be seen in use by primitive people. Modern ploughs are of various types, differing in essential features according to the varying conditions of soil and climate. The single-furrow ploughs include one wheel and two wheel types.

Disk ploughs which have the share and breast of the ordinary form displaced by a large, steel, concave cutting disk, are sometimes used in America, for work in very hard or heavy soil where a breast plough would be impracticable. Turn west ploughs are used horizontally on hill sides, turning the furrow all in one direction downwards. Double and multiple ploughs can be used on light land to economise manual and horse labour, if other motive power is not available.

Among special purpose ploughs are the double breast or ridging plough and the subsoil plough which travels in the furrows behind an ordinary plough, breaking up a panned subsoil. Other special types are constructed for drainage work such as the mole plough. The essential parts of a modern type of common plough are the beam to which the handles are attached, the frame or body which is bolted to the beam and which carries the breast or mould board, the cutting share and the hake or head and chain to which the horses are attached. The large or furrow wheel is placed on the right of the cross bar running in the furrow and regulating the width of the furrow slice. The small or land wheel is on the left of the cross bar running on the unploughed land; it heightens the depth of ploughing. The coulter attached to the beam makes the vertical cut of the furrow slice, and the skim coulter attached in front paces off the top of the furrow on the left side. The breasts of ordinary ploughs are fixed on the right hand side and turn the furrow slice on that side only. The work is therefore done in ridges or lands of equal width varying from 8 to 66 ft. The three forms of furrows are the rectangular, the crested or high cut and the wide broken furrow. The effect of ploughing is to invert the top surface of the soil so as to pulverise it and turn under the surface plant growth which is liable to decomposition. The depth of ploughing depends on the condition of the soil and subsoil and whether the crop that is next to occupy the land is deep or shallow rooting. When the plough paces at the same depth year after year a harden layer or pan is formed through which the roots of cultivated plants cannot penetrate. Ploughing is done as early as possible in autumn so that, especially on the heavier soils, the weather may exercise its beneficial effects as long as possible. Ploughing is impossible during hard frosts and is undesirable in continuous wet weather. Ploughing by steam power is now ousted by the far more economical tractor, driven by internal combustion engines. Tractor ploughs with multiple breast embody the principles of the horse plough and are of two main types, the trail plough, with the breasts mounted on and regulated from the beam and the 'Unit' type plough, mounted directly on the tractor and being raised by the tractor's hydraulic lifting gear. For deep or difficult work specially strong and heavy tractor ploughs are used. They are frequently drawn by tracklaying machines. On small areas, hand guided

petrol tractors with one or more ploughs attached are in general use.

Plövidj 1 Dist. of Bulgaria in the S E part of E Rumelia. Area 6116 sq. m. Pop 877 000. 2 Cap. of E Rumelia, in the above dist., is seated on a small is. formed by the Maritza R. in W N W of Adrianople. It was founded by Philip of Macedonia, the father of Alexander the Great, under the Rom. Empire it was the cap. of the prov. of Thracia, long in possession of the Turks. It contains several mosques. It is the seat of three bishops: Catholic, Greek and Bulgarian, and is situated in the midst of a vine and fruit growing country, being specially noted for its mulberries. The industries are connected with tobacco, dist. of roses, cotton silk, leather, and cloth. The town was almost demolished by an earthquake in 1816, but was rebuilt later. Pop 100 000.

Plover, name for various limcoline birds of the subfamily Charadriidae, characterised by a short bill, weak at the base and strong at the tip, the nostrils in deep longitudinal grooves. A typical species is the golden P. (*Charadrius pluvialis*), which is plentiful on moors and on coasts of most parts of Britain in winter. It is about 10 in. long and in winter the upper part of its body black with large yellow spots, and white throat and under parts, changing to black in the spring. It nests on the ground laying four yellowish eggs blotched with brown. It is these as well as the eggs of the lapwing or green P. which are highly valued as a table delicacy. The Kentish P. (*Agallus cantiana*) is a summer migrant breeding in considerable numbers in the Romney Marshes. The ringed P. or ring dotted (*A. hiaticula*) is a small bird with a black bill and on the throat. Colonisation in the London area was first noticed in 1944 and three years later the first pair were seen in Yorkshire. The Norfolk P. or stone curlew (*Idoneus crepitans*) is also a summer migrant frequenting sandy lawns. See also A R Union. *The Jaywing* 1949.

Plöyshtj, see Proishtj.

Plücker, Julius (1801-68) German mathematician and physicist, b. at Lüneburg. Educated at Düsseldorf and at the Univ. of Bonn, Heidelberg and Berlin he went to Paris in 1823 and conferred with Fourier. At Bonn he became privat docent 1822, and prof extraordinary 1829. His first great work was *Analytisch geometrische Entwicklungen* (1828-1831). In it he introduced a concise notation now universally used by mathematicians. The first vol. applied this notation generally, but entered specially into the subject of curves, and the determination of the whole course of any curve from a limited number of points taken in it. The second vol. established the principle of duality or reciprocity. He became prof. of mathematics at Halle 1834, and Bonn, 1835. Then came the following works: *System der analytischen Geometrie* (1835), *Theorie der algebraischen Kurven* (1838), and *System der Geometrie des Raumes* (1846). In 1847 he became prof. of physics

at Bonn, and he soon appeared as an original worker in his new subject. His writings on physios were contributed to *Poggendorff's Annalen*. First he dealt with the magnetic properties of crystals, and the properties of magnetic and diamagnetic bodies; then, earlier than Hunsen, he announced that lines in the spectrum were characteristic of the chemical substance emitting them. Toward the end of his life he returned to his earlier field of study, and developed what is now called Line geometry, adapted to three-dimensional purposes in which the unit is, instead of the point, the straight line.

Plum (*Prunus domestica*), cultivated variety of *P. communis*, one of the most important hardy fruit-bearing trees. In planting regard should be had to varieties, which are very numerous. A strong retentive loam in which lime is present is the most suitable soil for *P.* culture, and the situation should be one freely exposed to light and air. For orchard culture, the standard form of tree is the most suitable, but the bush and pyramid forms are valuable for gardens. The fan-trained tree is the best for wall culture. *P.*s. are very successfully grown in pots in light, airy glass-houses. See H. V. Taylor, *Plums of England*, 1919.

Plumage, see BIRD; FEATHERS.

Plumbago, genus of herbaceous plants and shrubs. *P. capensis*, a native of S. Africa, is a valuable greenhouse plant, and may be trained on stakes or trellises. It bears blue spikes of flowers. Sev. species have medicinal value.

Plumbago, see BLACK-LEAD.

Plumber-work, see under BUILDING.

Plumbism, see LEAD POISONING.

Plumer, Herbert Charles Onslow, first Viscount (1837-1932). Brit. soldier, great-grandson of Sir Thomas P., one-time master of the rolls. Educated at Eton and Sandhurst, he began service in the York and Lancaster Regiment, 1876. He served in the Sudan in 1881, being mentioned in dispatches; in S. Africa 1896, where he raised and commanded a mounted Rifle Corps, and distinguished himself in the S. African war in the operations in Rhodesia, his most notable achievement being the relief of Mafeking. Major-general, 1902, he was quartermaster-general to the forces and a member of the Army Council 1904-5, and appointed general officer commanding N. Command in 1911. In the First World War he held successively the following commands: Fifth Army Corps (1915), Second Army Brit. Expeditionary Force (1915-17); 1st Expeditionary Force, (Nov. 1917-March 1918); and from 1918 the Second Army of the Brit. Expeditionary Force in France and Flanders. His outstanding achievement on the W. front was the victory of Messines Ridge in June 1917. It is worthy of record that he never favoured the offensive against Passchendaele Ridge. He was sent to Italy immediately after the disaster of Caporetto (q.v.). In the final advance on the W. front his army cleared the Gers. from the high ground E. of Ypres and from Ploegsteert (q.v.) Wood and Messines,

forced the evacuation of Lille and, by the armistice, had reached the Scheidt and Ghent. After the armistice he commanded the Brit. Rhine Army. On his return to Britain he received the thanks of Parliament, a grant of £30,000, and a barony. In 1919 he was made governor of Malta, and in 1925 high commissioner of Palestine and Transjordan. See life by Sir C. Marington (his chief of staff in France and Italy), 1935. P. is buried in Westminster Abbey.

Plumpton, vil. of Sussex, England, 4½ m. N.W. of Lewes. Race meetings are held annually from Sept. to May. Pop. 760.

Plumstead, par. of London, England, in the bor. of Woolwich (Kent), which it adjoins. P. Marshes (about 5½ m. from Erith) are chiefly used as a military range, and contain powder magazines. The pop. is included in that of Woolwich.

Pluralism (eccl'es.), system of holding more than one living or benefice with cure of souls at the same time. This, among other personal privileges and emoluments of the clergy, was forbidden in England at the time of the Reformation by an Act of 1529. That Act, which deprived the clergy of the power of holding pluralities by virtue of papal licences purchased for money, and made residence obligatory, only permitted pluralities with respect to benefices above the yearly value of £8. In the eighteenth century, however, P. was rife. Pluralities are now regulated by Acts of 1837 and 1885, the former of which repealed the Act of 1529 and declared pluralities illegal except where the livings were of small value and situated in dists. of a small pop. The amending Act of 1885 provides that two benefices may, by dispensation from the archbishop of Canterbury, be held together if the churches are within 4 m. of each other and the value of one of the benefices does not exceed £200.

Pluralism, metaphysical theory that all existence is ultimately reducible to a multiplicity of distinct and independent beings or elements. As such, P. is directly opposed to monism (q.v.) and is distinguished from dualism in that it postulates many realities and allows greater qualitative diversity. To-day it is usual to notice only materialistic and spiritual P. There is an increasing departure from the postulations of materialistic P. since it offers no explanation of the origin of mind, declaring that mind itself is not real. Bertrand Russell formulates a variation on the theme by propounding that the world, so far as we know it, is composed of a number of elements, and one method of arrangement produces mind, while another 'pattern' produces matter. P. describes rather than explains mind, and critics hold that limit to be its chief weakness. Spiritual P. is the form most widely considered to-day. It is based upon the conception of Leibniz (q.v.) that reality is made up of an infinite number of individual forces, whose nature is psychic. These he terms 'monads,' and he claims that God has evolved them to fulfil His ultimate will.

He shows a movement of complete upward development from one level to the next. This theory is supported by Howison in America, though it has not yet been satisfactorily explained how there can be interaction between individual minds having a concrete existence as Wm James declares. P forms the basis of many theistic theories which begin by assuming the origin and ultimate development of individual minds. It is this assumption which provides critics with most of their material. See also MONAD AND MONADISM. See Leibniz *Monadology*, 1714, W James *A Pluralistic Universe*, 1910, C A Richardson *Spiritual Pluralism and Recent Philosophy* 1919, and W Carr *A Theory of Monads* 1922.

Pluralism (political theory) theory which regards the state as an institution essentially similar to churches, trade unions, etc. Thus follows a denial that the state has any theoretical claim to sovereignty over such other institutions. H J Laski (q.v.) is the prime exponent.

Plurality (in logic) contention that a certain effect is not produced by one and the same cause, but that different causes can result in similar effects. The theory was laid down by J S Mill (q.v.), and is referred to as P of causes. While the statement may be superficially true, under close examination it is doubtful for many effects which appear to be similar or fundamentally different in kind or degree. For example, many causes will produce unconsciousness in the human mind and apparently this instance bears out P as a feasible contention but there are many kinds of unconsciousness, each very different from the other. Meticulous inquiry therefore rejects much of the evidence which is brought forward to support the theory. See J S Mill *Logic* 1871.

Plural Voting, electoral system that allows a person to have more than one vote at the same election. For parliamentary elections in the United Kingdom before 1918 there was a certain amount of P V inasmuch as a man could qualify as a landowner although not as a resident in several constituencies. By the Representation of the People Act 1918 P V was almost abolished and the position then was that a person could not have more than two votes, and these had to be given in two constituencies. Thus he could be registered both in respect of a residential qualification and also as a voter in a university constituency or again in respect of a residential qualification and in respect of business premises. But the Representation of the People Act 1928 provided for the complete abolition of P V by abandoning all university constituencies and removing the business premises vote.

Plush (contraction from *peluche*, hairy fabric), kind of cloth of silk, cotton or wool, or a mixture of these woven like velvet, but having a longer and softer nap. It is used chiefly for rich garments, cloaks, and upholstery, and especially for footmen's knee breeches and liveries. "Hatter's P" is used for the outside of top-hats.

Plutarch (Πλουταρχος) (c. A.D. 46—after 120), Gk. miscellaneous writer, philosopher and moralist, and biographer b. at Chaironeia, Boeotia. He lectured on philosophy at Rome during Domitian's reign, winning the friendship of persons of distinction and holding high office under Trajan and Hadrian. He d. in his native town where he probably wrote most of his famous *Βίοι Παράλληλοι* (forty-six parallel lives of Gks and Romas, arranged in pairs for comparison) and four single lives. The interest of these biographies is mainly ethical and not historical, but they remain among the great books of the world and their influence has been vast. P's style is honest but sometimes cumbersome and obscure. Among the couples compared



PLUTARCH

W F Munsell

to Theseus and Romulus, Pericles and Fabius Maximus, Alcibiades and Coriolanus, Alexander and Caesar, Demosthenes and Cicero. His philosophical and ethical works are usually grouped together as *Opera Moralia*. They treat of a variety of subjects and are valuable for numerous quotations from lost Gk. poems and dramas.

Library—*Plutarch's Lives* (Lindsay & Co. K. Ziegler (ed.) 1914 39 B Perrin (ed.) 1914 26 *Moralia* G N Bernardakis 1898 90 C Hubert W Nachstadter 1925, E C Babbitt H N Fowler W Heinhold (ed.) 1927 7 TRANSLATIONS (in addition to Loeb texts above) *Lives* Sir F North, 1879 1928 1929 30 Dryden revised by A H Clough (Levyman's Library). See A. Weissaker *Untersuchungen über Plutarch's biographische Technik* 1931 and N I Barbu *Les Procédés dans les biographies de Plutarque* 1931.

Pluto (Πλούτων) or Hades in Gk. mythology the god and ruler of the underworld (Hades) identified with the Roman Dis. He was son of Chronos and Rhea.

brother of Zeus and Poseidon, and carried off Persephone to be his queen.

Pluto. The discovery of Neptune (*q.v.*) in 1846 from its perturbations on Uranus suggested that a similar method could be used for detecting a trans-Neptunian planet, if such existed. Percival Lowell, working on lines similar to those adopted by Leverrier and Adams, indicated where the planet would be found, but did not live to see his prediction fulfilled. On Jan. 21, 1930, C. M. Tombaugh at the Lowell Observatory, Flagstaff, Arizona, was rewarded for his efforts, as a photographic plate showed the image of the new planet which he had sought for years. The result of examining the plate was announced on March 13 of the same year. Although it was nearly in the direction predicted by Lowell it was much nearer than he had suggested, and it was probably by good fortune that search in the right place was carried out. The new planet named P. was found to be moving in a very eccentric orbit, eccentricity 0.248, at an inclination of nearly $17^{\circ} 9'$ to the ecliptic. It takes nearly 248 years to complete a revolution round the sun from which its mean distance is 3,666,000,000 m., but its high eccentricity makes it approach the sun to within 2,675,000,000 m. at one time and to recede to 4,657,000,000 m. at another, so that it comes within the orbit of Neptune during its revolution round the sun. Its period of axial rotation, diameter, and mass is unknown, but it is probably comparable with Mars in size and mass. If it has any satellites they are too small to be detected, even with the most powerful of modern telescopes. It is thought that there may be one or more planets beyond P. but this is mere conjecture.

P.L.U.T.O. (pipe line under the ocean), see under PIPE-LINE.

Plutonia, see under IGNEOUS ROCKS.

Plutonium (symbol Pu), metallic element made by bombarding uranium with neutrons. Its atomic weight is 239 and its atomic number 94. It can itself be disintegrated by neutrons, enormous amounts of atomic energy being liberated explosively (as at Nagasaki). At first P. was believed to be a purely artificial element, but later it was stated that it occurs naturally in minute amounts. Its atomic fission can be controlled, which makes it suitable as a source of atomic energy for industrial purposes.

'Pluto, Operation,' see under PIPE-LINE.

Plutus (Πλούτων), (Gk. personification of riches, son of Demeter and Iasion, often represented as both lame and winged. He was said to have been blinded by Zeus that he might bestow his gifts indiscriminately.

Pluvius, title given like 'Pluvialis' and 'Imbricifer' to the Rom. Jupiter as the sender of rain.

'Plymouth, important naval and commercial seaport, of Devonshire, England, situated between the estuaries of the Tamar and Plym Rs. on the boundary of Devon and Cornwall, nearly 250 m. by rail W.S.W. of London. Originally three separate tns., Devonport, E. Stonehouse,

and P. An amalgamation took place in 1914 under the inclusive name of P. There are three harbours, Sutton Pool, Catwater (Cattewater), and the Hamoaze, which unite in P. Sound, a spacious bay which has a breakwater a mile in length across the entrance; nearly 4,000,000 tons of local stone were used in its construction. The chief gov. establs., viz. the dockyard, barracks, gun wharves, etc., are at Devonport. At Stonehouse are the naval hospital, Royal Marine barracks, victualling yards, etc., while P. is the centre of trade. After the Second World War a number of new industries were estab., giving employment to many thousands of workers in the manuf. of clothing, radio equipment, lubrication products, and processed foods.

Historically P. is one of the most interesting cities in Great Britain. It was from here that Drake, Hawkins, and Grenville sailed on many of their great voyages; the *Mayflower* set forth from P. with the Pilgrim Fathers to America; Capt. Cook led his first voyage of circumnavigation, and his last and fatal voyage of 1776, from this same port. Dominating the city are the mighty ramparts of the seventeenth-century citadel, built soon after the long and stubborn sieges when P. successfully withstood the attacks of the Royalists in the Civil war. In and around the city there remain very many relics of these aspects of her ant. past. The sect known as the P. Brethren (*q.v.*) originated here after 1830. The tn. returns two members to Parliament.

In the Second World War P. was subjected to many intense aerial bombardments, and the record of death and destruction made it proportionately the worst hit city in Great Britain. Civilian casualties alone were 5620, with 1172 killed; 73,102 houses were damaged, with 7354 completely destroyed. Nearly all the civic buildings, including the public library with its total stock of 80,000 books, were wiped out. As a result, many of the narrow winding streets of the old tn. completely disappeared and the city was faced with a vast problem of reconstruction. In 1913 a 'Plan for Plymouth' was pub. propounding a scheme of redevelopment which envisaged one of the finest city centres in Europe.

Amongst the city's many attractions to visitors is P. Hoe, on which Drake was playing his historical game of bowls when report was first received of the sighting of the Sp. Armada in 1588. P. has a marine biological station and aquarium. It is a point of departure for ocean-going steamers, and is a seaplane base. The estimated pop. of 220,800 in 1931 was reduced by over 50,000 as a result of the air raid destruction. The estimated figure for 1948 was 178,000.

Plymouth, chief tn. of Plymouth co., Massachusetts, U.S.A., situated about 35 m. S.E. of Boston. It is the oldest tn. in New England, having been founded by the Pilgrim Fathers, who left P. in England and settled there in Dec. 1620. It stands on a fine harbour, the commerce is considerable, and the chief industries are

the manuf. of iron goods and fishing. There are sev. handsome churches and a fine hall, where there are pilgrim relics and historical paintings. Pop. 18,000.

Plymouth Brethren, or **Darbyites**, religious sect which started in Dublin about 1830, and thence spread to Plymouth, Bristol, London, and other tns. Originally a reaction from formalism and clericalism, it gained numerous converts, many of them of high social position, through the work of John Nelson Darby (1800-82), a barrister, who gave his life to evangelistic work in Ireland, England, Switzerland, and other continental lands, as well as visiting America. P. B. were at one time widely known as *Darbyites*. Divs. in the Plymouth meeting led, after much controversy, to a separation of the 'Open' from the 'Exclusive Brethren,' the latter refusing fellowship with any but baptised believers of their own persuasion. There have been many other internal disputes, but the movement continues powerful in sev. countries. P. B. stand for a simple world-renouncing piety, regard 'the Bible as infallible, look for the speedy Second Coming of Christ, reject a professional ordained ministry, and 'break bread' together weekly in memory of the death of Christ. Each local meeting is regarded as autonomous under the guidance of the Holy Spirit.

Plymouth Sound, arm of the Eng. Channel between Devonshire and Cornwall, covering an area of 4500 ac., including the following inlets: the Catwater, Sutton Pool, Mill Bay, Stonehouse Pool, and the Hamoaze, the latter used as a naval harbour, and Cawsand Bay on the W. An immense breakwater was completed in 1841, and this shelters the harbour from the S.W. gales. It is nearly a mile long, and lies 2½ m. to the S. of the Hoe. There is a lighthouse at the W. end.

Plympton, mkt. tn. of Devonshire, England, 4½ m. N.E. of Plymouth. P. is a 'stannary' tn., comprising the pars. of P. St. Mary and P. St. Maurice; the latter was a bor. until 1842, and was the headquarters of Prince Maurice (1643) and the bp. of Sir Joshua Reynolds (1723), who was educated at the grammar school (founded 1658). St. Maurice has also an anct. guildhall, and there are ruins of an old castle. Pop. 10,000.

Plymstock, par. and vil. of Devonshire, England, on the Catwater and Plymouth Sound, 3 m. S.E. of Plymouth. Limestone and marble are found. Pop. 9000.

Plympton, int. of Wales, in Montgomeryshire, 10½ m. W. of Llanidloes. It is formed chiefly of clay-slate with veins of lead. Height 2469 ft. The Wye, Severn, Llynfant, Rhedol, and Ystwyth Rr. rise on its slopes.

Plywood, thin layers of wood, with the grain running in opposite directions, glued together under pressure. P. is extensively used in much joinery which was formerly worked in solid wood, e.g. panelling (q.v.). Although the modern form of P. has only been produced in recent years, certain forms of lamination have been used by wood-workers from very early times. In an Egyptian tomb

a headpiece to a bedstead was discovered, which had been built up on the P. principle and veneered in laburnum wood, inlaid with gold, although it is not known how the laminations and veneers were cut and cemented or glued together. Joinery experts consider that the use of central heating in buildings, and the high temp. demanded on ships, necessitating the production of a medium that would stand up to these modern requirements, led, if not to the actual introduction of P. in recent years, certainly to its rapid development, which has had considerable influence upon the design of modern work. Its production on a large scale has revolutionised the joiner's craft. In the past, design and construction had been greatly modified by the nature of the wood, the joiner working in solid wood having always to allow for some amount of shrinkage in his material. The shrinkage in P., however, is almost non-existent; while the large sizes in which it is now produced (Glaboon sheets of 65×183 in. are not exceptional) and the invention of new joinery machinery, has meant the adoption of larger, less detailed designs. P. is widely used for doors, screens, and corridors in shops and offices, and in the fitting out and decoration of ships. The three types of P. in general use are multiply, laminated board, and block board. Multiply is built up of three, five, seven, or more layers of thin wood cemented together so that the grain of alternate layers runs at right angles. Laminated board has a core, consisting of narrow strips of wood set at right angles to the encasing plies, over which sheets are then cut across the grain and the cord finally faced on both sides with outer laminations. Block is similar in construction to laminated board, the difference being that the inner core of block board is made up of wide laminated strips or blocks. These three types are manufactured in three grades of different quality. See also PANELLING; VENEERING.

Pilsen (Ger. Pilsen), tn. of Bohemia, Czechoslovakia, 71 m. S.W. of Prague. It is well built and has some fine edifices, chief among them being St. Bartholomew's Church (fifteenth century), the Renaissance tn. hall, and sev. museums. It is famous for its beer, and manufs. wine, sugar, pottery, paper, leather, cut glass, etc. The first printing press of Bohemia was set up here. Near by is the Skoda armament works. Pop. 118,100.

Pneumatic Chemists, The, name frequently applied to those seventeenth- and eighteenth-century chemists who particularly applied themselves to the study of gases. Prominent among them were J. B. van Helmont, Joseph Black, Joseph Priestley, and the Hon. Henry Cavendish. The first of these invented the word *gas* (from *geist* and *chaos*).

Pneumatic Despatch, see TUBES, PNEUMATIC.

Pneumatic Power Transmission. The use of compressed air in modern engineering has sev. advantages to recommend it (see PNEUMATIC TOOLS). The famous Mont Cenis and St. Gothard tunnels, in whose

construction compressed-air engines were employed to operate the drills, drew attention to the possibilities of this form of engineering that has since risen to second place to electrical power in the world of general engineering. Compressed air is used in mines, where other forms of power are dangerous, for operating pneumatic tools, sump pumps, and hoists. Most engineering works also use compressed air in the foundries for operating moulding machines, for drying cores and cleaning completed castings by sand blast. In other parts of engineering works compressed air is used for drilling, riveting, chipping, grinding, etc., and for paint spraying.

For normal installations where the air main is not long the pressure is approximately 100 lb. per sq. in., but where long mains are used higher pressures may be used with a reducing valve near the scene of operation. To the qualities of convenience and safety of the compressed air system are added the general quality of convenience of installation. The compressed air plant generally consists of a compressor, with its prime mover, complete with drives and accessories, which may include after-cooler, moisture separator, receiver, and in addition air piping. It is important that the piping installation, particularly if it is to serve a large area, should be of ample diameter to ensure a sufficient velocity of air and to prevent undue loss of pressure due to friction. Usually a velocity of 30-40 ft. per sec. through the pipes is satisfactory, but care should be taken that there are no sharp corners, and wherever possible bends or sweeps should be used when the air stream changes its direction. To obtain dry air at the point of application it is important to arrange that all branches from the main supply pipe connect to the top of the piping, and there should also be a slope in the piping preferably away from the receiver so that any moisture or oil coming out of suspension will flow in the direction of the air stream. Such oil and moisture is drained away wherever necessary by arranging a downward branch to each length of main and fitting a drain valve at the bottom. The pipe need only be of a strength requisite to the pressure; the jointing of the pipes is important in order to prevent leakages. In cases where the compressed air is required at some distance from a power supply portable compressors are used. These are self-contained units mounted for easy transportation and the compressors can be driven by petrol or Diesel engine, or by electric motor.

Pneumatics, term now almost obsolete, since it merely implies the study of the properties of gaseous fluids, and is therefore included in the term *Hydrodynamics*.

Pneumatic Tools, tools and appliances using compressed air as their motive power. These may be conveniently classified under four main headings: rock drills; pneumatic tools (percussive); pneumatic tools (rotary); pneumatic appliances.

Rock Drills. This term is applied to all

machines using compressed air for the perforation of rock and similar substances by combined percussive and rotary action. A blow is delivered to the drill steel either directly or through an anvil block by a piston which reciprocates in the cylinder, the movement of the air to the piston being controlled by some form of automatic valve designed to make the piston strike a heavy blow at speeds varying from 800 to nearly 3000 blows per min. **Pneumatic Tools (Percussive)**. These are percussive tools for concrete breaking, clay digging, chipping, caulking, riveting, etc. The action is similar to the rock drill, but the shank does not rotate. **Pneumatic Tools (Rotary)**. This term is applied to rotary tools for drilling, grinding, tapping, reamering, etc., and describes the tool which produces and transmits rotary action to a twist drill or other attachment. **Pneumatic Appliances**. This term is applied to machines, etc., which use compressed air for purposes other than those specifically included under rock drills and pneumatic tools, such as air motors, hoists, coal cutters, etc. Also included are impact wrenches, spray guns, cement guns, air brakes, air chucks, air lift pumps, sump pumps, sand blasting.

The advantage of all P. T. lies in their efficiency in operation, in the fact that the tools and compressed-air plant can be transported with ease, and in that they are almost foolproof so that little training is required for their use.

Pneumatic Trough, vessel used for collecting gases over a liquid (generally water). The trough is filled with water, and jars to contain the gas are filled with water and inverted on a 'beehive' shelf. The gas passes up through the perforated shelf and fills the jars by displacement. For the collection of gases soluble in water, the latter may be replaced by mercury. The P. T. was invented by R. Boyle (1627-91), J. Mayow (1643-79), S. Hales (1677-1761), and J. Priestley (1733-1804).

Pneumatic Tyres, see **TYRES**.

Pneumatolysis, see under **PETROLOGY**.

Pneumogastric Nerve, *vagus* (i.e. 'rambling,' referring to its wide distribution), or tenth cranial nerve. It originates in the floor of the fourth ventricle and supplies the ear, pharynx, larynx, heart, lungs, œsophagus, and stomach by its branches, the auricular, pharyngeal, superior and inferior laryngeal, cardiac, pulmonary, œsophageal, and gastric nerves.

Pneumonia, inflammation of the lung. Used without qualification, the term denotes *lobar* or *acute crumous P.*, an acute infectious disease caused by a specific micro-organism and running a course divisible into the following stages: (1) *Congestion*: the lung substance is gorged with blood and is heavier than normal, though it still contains air. (2) *Red hepatization*: an exudation of fibrinous material mixed with epithelial cells and blood corpuscles takes place; the colour of the lung is dark red and the substance resembles liver tissue. (3) *Grey hepatization*: a degenerative change

takes place in the exudate, and the colour turns to grey, while the lung maintains its liver-like consistency. In favourable cases the exudate may be absorbed or expectorated, and the lung becomes rapidly free from fibrinous material. Where resolution does not take place, death may occur from poisoning of the blood or extension of the inflammatory process. The most common complications are pleurisy, empyema, endocarditis, pericarditis, and meningitis. The symptoms at the early stage are shivering, cough, and fever, the temp. rising to 104° or 105°. There is a characteristic dusky flush, laboured breathing, and pain in the side, particularly if pleurisy be present. The expectoration is at first viscid and colourless, but afterwards takes on a reddish hue, due to the presence of epithelium, blood corpuscles, etc. A dull sound is produced by percussion of the affected part and fine crepitation may be heard during the stages of congestion and red hepatization, while a coarser crepitation is audible when grey hepatization sets in. In a majority of cases there is a crisis between the sixth and eighth days; if the outcome is favourable the temp. rapidly falls, and the patient proceeds to recovery in a remarkably short time. The cause of P. is probably bacillary infection, but the *Diplococcus pneumoniae*, which is credited with the causation of the disease, is found in the secretions of healthy persons. In nearly every case the onset of the disease can be adduced to a lowered vitality occasioned by pre-existent disease. Alcoholic and diabetic conditions especially predispose to P. Treatment is usually symptomatic. Careful nursing, with attention to fresh air, is essential. Heart weakness should be treated with strychnine or digitalis. Hopeful results have been obtained by the use of sera and vaccines, particularly that prepared from the patient's own diplococci. The sulphonamide ('M. and B.') drugs are extremely useful in the treatment of P. Broncho, catarrhal, or lobular P. is a catarrhal disease of the bronchi which finally involves the parenchyma of the lungs; it is often fatal in children under five. Interstitial P. is a chronic inflammation marked by increase of the connective tissue; it is usually caused by the inhalation of dust, etc. For P. in horses see under HORSE (DISEASES).

Pnom-penh, Panompenh, Penomping, Phnom-Penh, or Namwang, cap. of Cambodia, situated on the Mekong, where a channel connects it with Lake Tonle-Sap, 130 m. N.W. of Saigon. There are factories at Khsach-Kandal near by for shelling cotton seeds. Rice, tobacco, salt fish, pepper, gamboge, indigo, maize, silk, cotton, and tortoise shells are exported. Boat-building is also carried on. Pop. 102,700.

Pnyx (Græc. from *πνυξ*, crowded), name of the public place of assembly in Athens. It was probably semicircular in shape, cut on a slope connected with Mt. Lycabettus, W. of the Acropolis and S.W. of the Areopagus.

Po (anct. Eridanus and Padus), largest riv. of Italy, irrigating the entire plains of Piedmont and Lombardy. It rises at the N. foot of Monte Viso in the Cottian Alps, on the Fr. border, flows N.E. to Saluzzo, Turin, and Chivasso, thence in a tortuous course past Piacenza and Cremona E. to the Adriatic, which it enters by a delta (35 m. long). Its chief mouths are the P. della Maestra, della Tolle, di Goro, di Gnocca, and di Volano. At Paria the riv. is only 300 ft. above the Adriatic's level, having dropped from over 6000 ft. Among its chief tribs. on the l. b. are the Dora Riparia (near Turin), Dora Baltea, Ticino (draining Lake Maggiore), Adda (draining Lake Como), Oglio (draining Lake Iseo), and Mincio (draining Lake Garda). On the r. b. are the Tanaro, Trebbia, Parma, and Secchia. As the current carries much sediment from the mt. torrents feeding it, the P.'s delta increases as rapidly as that of the Mississippi. Below Piacenza embankments are kept up to prevent inundations. Canals connect the various tribs. with each other and with the P., the chief being Cavour Canal joining the Ticino and the P. The total length is 355 m., and the drainage area 29,000 sq. m. The P. is navigable beyond Turin. Sturgeon, salmon, and other fish abound, and its valley is a highly productive agric. area, rice being an important crop. It has been many times used as an invasion route, and was the scene of many Austro-It. conflicts. In the Second World War campaigns on the It. front the Allies under F.-M. Alexander reached the P. on April 23, 1945, having, after a long struggle, captured Bologna (April 20). The Gers., retreating across the P. valley on April 22, were bombed with devastating results. With the fall of Modena and Ferrara S. of the riv., the Allies were in a position to cross (April 24). Six days later all Ger. armies in Italy surrendered. See *further under ITALIAN FRONT, SECOND WORLD WAR, CAMPAIGNS ON*.

Poaching, see GAME LAWS.

Pocahontas (c. 1595-1617), Indian princess, noted in the colonial hist. of Virginia, daughter of Powhatan, an Indian chief of Virginia. She is famous for Smith's story in his *True Relation* (1608) and *General History of Virginia* (1624). Smith states that he was captured by the Indians and condemned to death, but was saved by the intervention of P., then a little girl. When she grew to womanhood she married John Rolfe (c. 1614), one of the Jamestown settlers, coming with him to England (1616). She d. and was buried at Gravesend, Kent, after giving birth to a son who subsequently returned to Virginia and is claimed as an ancestor by many prominent families in the state. John Randolph of Roanoke claimed descent from her. See Deane's ed. of Smith's *True Relation*, 1866; E. D. Neill, *Pocahontas and her Companions*, 1869; E. Eggleston and L. E. Seelye, *Pocahontas*, 1879; W. Robertson, *Pocahontas and her Descendants*, 1887; and C. Poindexter, *Captain J. Smith and his Country*, 1893;

also lives by W. Robertson and D. Garnett, 1933.

Pocatello, tn. of Idaho, U.S.A., in Bannock co., situated near Fort Hall. It is a railway junction and manufs. cement blocks and malt liquors. Pop. 18,100.

Poohard, or Red-headed Poker (*Nyroca ferina*), handsome duck which occasionally breeds in Britain, but which is imported in considerable numbers from Holland for the market. The male's head and neck are chestnut-red; the breast, upper part of back, quill feathers, and rump are black; the sides and the under parts are greyish-white and the base and point of the bill are black, and the central portion pale blue. The female's bill is black and her plumage is greyish-brown except for the greyish-white under parts. Ps. feed largely on water plants, for which they dive. The nest is made in long grass on the borders of lakes and pools.

Po-Chü-Li, Chinese poet of the eighth century. He rose high in the civil service, but the tangle of intrigues and insurrections making life hazardous, he gave up his career when middle-aged, and devoted himself to poetry, achieving great fame in the E. His poetry shows a concentrated and powerful vision: a friendship is the chief emotional urge of his life. See A. Waley, *Life and Times of Po-Chü-Li*, 1919.

Pocket Battleship, see 'ADMIRAL GRAF SPEE'; NAVAL OPERATIONS IN THE SECOND WORLD WAR, *Naval Operations in European Theatre of War in 1945*; NAVY AND NAVIES.

Pocket Borough ('rotten' borough), see ELECTORATE.

Pocklington, mkt. tn. of the E. Riding, Yorkshire, England, 13 m. S.E. of York. There are corn mills and breweries, and manufs. of agric. implements. Wilberforce (b. 1759) was educated at the grammar school (founded 1515), now a large public school. The church is a thirteenth- to fourteenth-century structure. Pop. (with Meltonby, Yapham, and Owthorpe) 14,300.

Poděbrad and Kunstat, Georg Boozkos von (1120-71), king of Bohemia, b. at Poděbrad. On the death of Štěpán (1438) he joined the Utraquists, supporting Casimir of Poland as ruler, and becoming their leader (1444). By 1452 he was regent for Ladislaus Posthumus, and elected his successor (1458). He was excommunicated by Pius II. (1463) and by Paul II. (1466) for failing to lead the country back to the Rom. Catholic Church. War broke out with Matthias Corvinus and the Hungarians, but peace was concluded about 1467. See L. Jordan, *Das Königthum Georgs von Podiebrad*, 1881; A. Bachmann, *Georgs von Podiebrad Wahl* . . . , 1876, and *Böhmen* . . . , 1899-1905.

Poděbrad, tn. of Czechoslovakia, in Bohemia, on the Elbe, 31 m. N.E. of Prague. Pop. 5000.

Podesta, lt. municipal officer of the twelfth to sixteenth centuries, the chief military and administrative official of the commune. Mussolini replaced the title of mayor by that of P.

Podgoritz, Podgorica, or Titograd, fort. tn. and cap. of Montenegro (Yugoslavia), 19 m. N.E. of Cetinje. In the vicinity are the ruins of Diocletia, where Diocletian was b. There are tobacco and saw-mill industries. Pop. 10,651.

Podgorze, tn. of Poland, in Galicia, on the Vistula, opposite Cracow, with manufs. Pop. 13,000.

Podmokly, see BODENBACH.

Podolia (low-lying land), area of the Ukraine, stretching from the W. Bug to the Polish-Rumanian frontier. It is the W. extension of the fertile black earth region of S. Russia. Along the S. edge of the Podolian plateau lies the Galician depression, which forms an important route, from Silesia, through Bessarabia and Rumania to the Black Sea, is watered by the Dniester (S.W.), an important channel for export trade, and by the Bug. Outliers of the Carpathians form a watershed between the S. Bug, the Dniester, and the Dniester. In N.W. P., between Lwow and the Dniester, lies a high plateau region, known as 'Opolye' (1200 ft. high), deeply fissured by the wide valleys of the rivers of the Dniester. The soil is very fertile, producing cereals, hops, flax, sugar-beets, fruits, and tobacco. There are flour and woollen cloth mills and distilleries. The market-gardening in the S. is noted, cherries, mulberries, melons, gourds, and cucumbers being especially fine. Kamionets-Podolsk is the chief tn. A railway runs from Odessa to Galicia through P. Occupied by the Gers. in 1941 it became the main centre of conflict in March 1944 when the Ger. defence system in the Ukraine was crumbling before the armies of Marshal Zhukov and Marshal Konev. See further under EASTERN FRONT or RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR.

Podolsk, tn. of the Moscow Region of the R.S.F.S.R., 25 m. S.W. of Moscow on the railway to Tula. There are manufs. of glass and locomotives, and silk weaving is carried on. Pop. 72,400.

Podophyllum, or May-apple, genus of herbaceous perennials (family Berberidaceae) with large ornamental shield-shaped leaves, and white or reddish-purple flowers, followed by red berries. *P. peltatum*, May-apple, or wild lemon, a native of N. America, is sometimes grown in damp borders; its leaves are poisonous.

Podostemaceae, order of branched and floating herbs, resembling liverworts, chiefly occurring in S. America.

Poe, Edgar Allan (1809-49), Amer. poet, story writer, and critic, b. at Boston. His father was of a well-known Baltimore family and his mother was Eng. Both died while he was a child. He was taken into the family of John Allan, a well-to-do tobacco merchant of Richmond, Virginia. Though he added the name of Allan to his own, he was never legally adopted. He was educated at Stoke Newington in Eng. (1816-21). Then he entered Richmond Academy, Virginia, and went to Virginia Univ. in 1826. His irresponsible behaviour displeased his guardian and he was put into Mr. Allan's office. P., unable to endure business life,

soon left for Boston to make his first efforts at self-support by literature. He pub. *Tamerlane and other Poems* under a pseudonym, in 1827. Becoming destitute he enlisted in the U.S. Army under an assumed name, but was bought out next year by Mr. Allan and appointed to a cadetship at the U.S. Military Academy. After six months he was court-martialled and dismissed for neglect of duty. From this time he made a scanty living by contributing to Amer. journals, and by the pub. of such masterpieces as *Tales of the Arabesque and Grotesque* (1840) and *The Raven* (1844), gained a very considerable



EDGAR ALLAN POE

reputation. He became editor of the *Southern Literary Messenger* of Baltimore, in which he initiated a style and freedom of criticism new to Amer. readers, and later of *Graham's Magazine*. He had married in 1836 his fourteen-year-old cousin, Virginia Clemm, a false statement as to her age being made at the time of the marriage. Their life was marked by poverty, which caused the bitterness in much of his work. She died in their little cottage at Fordham, near New York city, in 1847. *Annabel Lee* (1819) was written in memory of her. Save for *Ulalume* (1847) and *The Bells* (1849), his work was at an end. Having occasion to visit Baltimore in 1849 he became ill there, and was found in the streets in a dying condition, expiring on Oct. 7.

The world has produced few more subtle or successful poetical craftsmen, for his verse, though small in bulk, exhibits extraordinary powers of technique and acquaintance with the subtleties of rhythm

and syllable change. Perhaps even more surprising was his ability to bring into play and weave into his tales and poems such an atmosphere of wonder and terror. He was the first to give a definition of a short story and one of the first to practise the art. In *The Mystery of the Rue Morgue* (1841) and other tales he was the originator of the modern detective story. He was no less notable as a critic, analytical and knowledgeable in literature. He was not given to light praise, but he was among the first to celebrate Tennyson, Dickens, Hawthorne, and others.

In Dec. 1949 a tablet was unveiled in Stoke Newington Central Library with the inscription: 'Edgar Allan Poe, b. 1809, d. 1849, American romancer, poet, and critic, was a pupil at the Manor House School which stood near this spot, during his boyhood, 1817-1820.' His prin. works, besides those named, are *The Fall of the House of Usher* (1839); *The Gold Bug* (1842); *Tales of Mystery and Imagination* (1850), etc. His *Letters* were ed. by J. Ostrom, 1949. See J. H. Ingram, *E. A. Poe: His Life, Letters, and Opinions*, 1880; J. W. Krutch, *E. A. Poe*, 1926; and A. H. Quinn, *Poe*, 1942.

Poet Laureate, see LAUREATE.

Poetry. 'Epic poetry and tragedy, as also comedy, dithyrambic poetry, and most flute-playing and lyre-playing, are all viewed as a whole, modes of imitation' (Aristotle). As the means of imitation, Aristotle enumerates rhythm, melody, and verse, but in comparing Homer with Empedocles he explains that writing in verse does not necessarily make P. This distinction is echoed by Hazlitt: 'All is not poetry that passes for such: nor does verse make the whole difference between poetry and prose. The *Iliad* does not cease to be poetry in a literal translation; and Addison's *Campaign* has been very properly denominated a Gazette in rhyme. Yet didactic P. (q.v.) from Empedocles to Pope is a recognised *genre* of P., and for practical purposes verse or rhythm is an essential part of P. Hazlitt recognises this: 'The best general notion which I can give of poetry is, that it is the natural impression of any object or event, by its vividness exciting an involuntary movement of imagination and passion, and producing by sympathy a certain modulation of the voice or sound expressing it.' This is an expansion of Milton's lines:

'Thoughts that voluntary move Harmonious numbers.'

No poetic theory denies harmony, although a repetitive metrical system has been dispensed with by Milton himself. The theory of Free Verse (q.v.) is, however, usually associated with certain twentieth-century groups of poets—Imagists, Dadaists, etc. A continuance of one kind of verse is characteristic, as Aristotle points out, of epic P., and in this it differs from dramatic P., although epic and tragic P. agree in being 'an imitation of serious subjects in a grand kind of verse' (see EPIC POETRY). The repetition of the verse form in lyric P. is proper to song

(see LYRIC), while the Gk. dramatic choruses and Pindar's odes represent a more sustained and ceremonial form of song. The false Pindaric or irregular ode has had an honourable tradition in Eng. from Spenser downwards (see ODE). The sonnet (q.v.) originated in Italy, and other intricate forms of P. (triolet, etc.) in France (see VERSE). Ballad (q.v.) P. combines lyric and narrative, while storytelling in P. from Chaucer to Massfield represents an epical form of P. in a lighter vein than that known to Aristotle. No account of P. and its various forms is complete without reference to the relations of P. with the age in which it is created. Shelley says truly: 'Poets, not otherwise than philosophers, painters, sculptors, and musicians, are in one sense the creators, and in another the creations, of their age.' W. J. Courthope, in his *History of English Poetry* (1910), adopts this conception of art, which is liable to be forgotten in the present age. He sums up P. in the definition: 'The art of Poetry is a mirror for the imagination of men living in a society at once historic and free. Its time-honoured forms, epic, dramatic, didactic, and lyric, are so many vehicles for the expression of ideas not merely existing in the mind of the individual poet, but representative of the action and character of those who live in his age and speak his language.'

For the P. of specific nations or national groups see the sections *Literature* under the heading of various countries. See also PASTORAL POETRY. See P. B. Shelley, *A Defence of Poetry*, 1821; G. Saintsbury, *A History of Criticism and Literary Taste in Europe*, 1900-4, 1917-1922; J. Massfield, *Salutary Ballads*, 1902; E. Marsh (ed.), *Georgian Poetry*, 1911-12; F. W. Moorman, *Yorkshire Dialect Poems and Traditional Poems*, 1917; A. St. John Adcock (ed.), *The Bookman Treasury of Living Poets*, 1925; Sir H. Newbolt, *New Paths on Helicon*, 1927; F. H. B. Lyon, *The Discovery of Poetry*, 1930; F. R. Leavis, *New Bearings in English Poetry*, 1932; K. Graham, *Cambridge Book of Poetry for Children*, 1932; T. S. Eliot, *The Use of Poetry and the Use of Criticism*, 1933; L. MacNiece, *Modern Poetry*, 1938; D. Daches, *Poetry and the Modern World*, 1941; C. M. Bowra, *The Background of Modern Poetry*, 1946; H. J. C. Grierson and J. C. Smith, *A Critical History of English Poetry*, 1917; C. D. Lewis, *Poetic Image*, 1947; and C. Brooks, *Modern Poetry and the Tradition*, 1919, and *The Well Wrought Urn*, 1949.

Poggibonsi, tn. of Siena, Italy, linked by rail with Florence. The church of S. Lucchese has frescoes by the Gaddi school. A fire caused by artillery shells in the Second World War burnt off the roof of the church, destroyed Raffello de Carli's 'Noli me Tangere' and a valuable triptych, besides damaging the frescoes.

Poggio Bracciolini, Giovanni (Gian) Francesco (1380-1459), It. scholar and humanist of the Renaissance, b. at Terranova. He became secretary to the Rom. curia (c. 1403), but never showed interest in eccles. or political affairs,

devoting all his energies to unearthing old classical MSS. Among his discoveries were sev. orations of Cicero, some plays of Plautus, Lucretius' *De Rerum Natura*, Quintilian, and fragments of Valerius Flaccus, Silius Italicus, and others. He himself wrote moral essays, *Historia Florentina, 1350-1455* (1476), in imitation of Livy, and *Liber Facetiarum* (see Lisleux's ed., 1878; Hazlitt, *Old English Jest-Books*, iii., 1864), a collection of humorous but often indecent stories aimed chiefly against the monks. Of his polemical invectives those against Filelfo and Valla are best known. He retired to Florence about 1452, becoming chancellor and historiographer in 1453. His *Opera* were printed at Basle (1539).

See Thomschmidt, *Dissertation*, 1713; J. Lenfant, *Poggiana*, 1720; H. Hallam, *Lit.*, 1837-39; G. Voigt, *Wiederbelebung der klassischen Alterthums*, 1859; M. Nisard, *Les gladiateurs de la république des lettres*, 1860; and J. A. Symonds, *Renaissance in Italy*, 1875-86; also lives by W. Shepherd, 1802, and E. Walker, 1914.

Poggio, Casalino, Barone di, see BATTISTINI, MATTEA.

Pogrom, Russian word, meaning 'devaluation,' and originally used to denote any organised persecution of any class of persons obnoxious to the Russian Gov., but generally applied to the massacres of Jews. The word 'pogromy' is used by Herman Roth in his article on 'Russia' in the *Jewish Encyclopedia* as meaning 'riots.' P's. (of Jews) ceased altogether in Russia after the Bolshevik revolution. They were introduced in Germany by Hitler as an integral feature of the racial doctrines of *Mein Kampf* (q.v.). The immediate cause or excuse for the general P. organised on Nov. 10, 1938, was the assassination of von Rath, an official of the Ger. Embassy in Paris, by a Jewish youth from Poland.

Pohutukawa, tree of New Zealand, commonly called the New Zealand Christmas tree because it flowers in Dec. It grows mainly along the coasts, and in summer time is a blaze of brilliant scarlet blossom.

Poetiers, see POITIERS.

Poincaré, Jules Henri (1854-1912), Fr. mathematician and physicist, b. at Nancy, where he was a pupil of the Polytechnic School. He was at first prof. at Caen, but was made prof. at the Paris Univ. in 1886, and elected to the Academy of Sciences in the following year. He discovered a new series of functions, to which he applied the term 'Fuchsian,' after Fuchs. In 1889 he won the king of Sweden's prize by his essay on the problem of three dimensions and dynamic equations, whilst the Royal Society of London gave him the Sylvester medal in 1901. Among his works may be mentioned *Sur la théorie des fonctions fuchsianes* (1881); *Cours de physique Mathématique* (13 vols., 1890-1899); *Théorie de tourbillons* (1893); *La Théorie de Maxwell et les oscillations hertziennes* (1899); *La Science et l'hypothèse* (1903); etc. See lives by G. Lebon (2nd ed.), 1912, and P. Appell, 1925.

Poincaré, Raymond Nicolas Landry (1860-1934), Fr. statesman; b. at Bar-le-Duc, son of Nicolas Antoinin Hélène P., civil servant and meteorologist. Educated at the Lycée de Bar-le-Duc and the Lycée de Louis le Grand, he entered the law and was for some time law-editor of *Le Voltaire*. He served more than a year in the Dept. of Agriculture. P. was elected Republican deputy for the Meuse in 1887; for Commercy in 1889, 1893, 1898, and 1902; was senator from 1903; minister of public instruction, 1893, and 1895; minister of finance, 1894-95 and 1906. In 1909 he was elected to the Academy. In Jan. 1912 he succeeded Caillaux as Prime Minister, becoming also foreign minister. He pursued a forward policy in Morocco, obtaining the sultan's recognition of the Fr. protectorate. He also enlarged the fleet. In 1913 he was elected president of the republic in succession to Fallières: Briand became Premier. P. visited Britain that year, and was in 1914 made lord rector of Glasgow Univ. In July 1914 he visited Russia; on his way back he heard of the Austrian ultimatum to Serbia, and wrote a remarkable letter to King George V. on the crisis (July 31). Amid the reverses of the war at the end of 1917 P. accepted as Premier his old opponent Clemenceau. P.'s term as president ended in 1920: he was succeeded by Deschanel, and re-entered the Senate. In Jan. 1922 he again became Prime Minister and foreign minister. Holding that Germany had defaulted, his gov., with that of Belgium, occupied the Ruhr, 1923. In 1924 he had to impose fresh taxation; the elections of that year went against him, and he resigned. An acute financial crisis, which destroyed one ministry after another with rapidity, occasioned his recall to power in July 1926. By new laws and drastic administrative decrees, he rapidly stabilised the franc, and his gov. endured until July 1929, when he resigned on grounds of health. P. pub. his memoirs under the title of *Au Service de France* (1926-33). They are obtainable in Eng. He also wrote literary, political, and scientific essays. See lives by H. Girard, 1913, and S. Huddleston, 1924; see also G. Wright, *Raymond Poincaré and the French Presidency*, 1943.

Poinading, in Scots law, denotes the process of 'attaching' the movables of a debtor to satisfy his debts. P. is either *real* or *personal*. *Real P.* or *P. of the ground* is the remedy of the *real* creditor or creditor whose debt is secured by a lien over or charge on land, or who holds a heritable security. *Personal P.* is the remedy of creditors in ordinary personal obligations and affects the debtor's goods and effects generally.

Poinsettia, or *Euphorbia* (*pulcherrima*), handsome greenhouse plant (family Euphorbiaceae) bearing brilliant scarlet, crimson, or white bracts in whorls. It is raised from cuttings inserted in a light compost in spring or late summer.

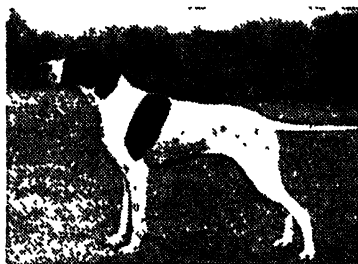
Point de Galle, see **GALLE**.

Pointe-à-Pître, seaport of Grande-Terre, Guadeloupe, Fr. W. Indies, 18 m. N.E. of

Basse-Terre, with a large trade and a good harbour.

Pointed Architecture, see **ARCHITECTURE**, *Gothic*.

Pointer, popular sporting dog, descended from Sp. dogs imported in the eighteenth century and crossed with foxhounds, a cross which has been employed to impart additional speed and dash. The P. is easily trained to point (i.e. stopping dead and remaining rigid when it finds game at close quarters), and in America has been taught to retrieve. Some very good Ps. have been of small size, but a big dog stands about 25 in. at the shoulder and weighs 60 lb.



POINTER

T. Fall

The colour of the coat may be black, black and white, orange and white, lemon and white, or liver and white, probably the most popular colour. The skull should be rather wide between the ears with marked drop at the top, the muzzle long, nose dark liver or flesh colour, ears set low and hanging flat to the head, neck well arched, shoulders sloping, chest wide and deep, body well ribbed up the loins, forelegs straight, hind-quarters powerful, and tail short and tapering.

Pointillism, see under **IMPRESSIONISM**.

Points Rationing, see under **FOOD CONTROL**, **BRITISH**, in **WARTIME**.

Point System, see under **TYPE AND TYPESetting**.

Point-to-Point Steeplechases. Steeplechases were so called in the first instance because they were races run from 'point-to-point,' the most prominent point, near which the finish was to take place, being a steeple or church spire. These early steeplechases were genuine races across country between two or more persons, and required a very good 'eye for country' as well as a sure seat in the saddle. One of the earliest steeplechases run was that in Ireland between a Mr. O'Callaghan and a Mr. Blake in 1752, from the church of Buttevant to the spire of St. Leger church, a distance of 4½ m. Records exist of other steeplechases of a similar nature being run in 1792 and 1824, but prior to 1831 there were generally only two or three participants, and no reference is found to a regular 'field.' As these fixtures grew in popularity and the number of entries increased, the nature of the races gradually

became changed; the spectators grew in number, and naturally wished to see all the race if possible. Thus the modern steeplechases, of which the Grand National is the most important, came into being; they are, however, not at all similar to the early 'point-to-point' chases, of which those held by modern hunts at the end of a season are the only surviving representation. Those contests are open only to horses that have been hunted locally, and no other races are run at the same time. See rules for P.-to-P. S. in *Ruff's Guide to the Turf*, etc.

Poison Gas, see **CHEMICAL WARFARE**; **PHOSGENE**.

Poisoning, Food, see under **FOOD AND FEEDING**.

Poisonous Plants. A large number of plants contain poisonous principles, many of which, under proper control, are valuable drugs. Among the commoner Brit. plants that are poisonous wholly or in part are the crowfoots, monkshood, the hellebores, baneberry, pasque flower, greater celandine, horned poppy, white bryony, hemlock, fool's parsley, water hemlock, water dropwort, wood sanicle, deadly nightshade, bittersweet, henbane, thorn apple, foxglove, spurge laurel, the spurge, dog's mercury, black bryony, daffodil, bluebell, meadow saffron, cuckoo pint, sorrel, wood sorrel, the elders, box, buckthorn, yew, as well as many fungi. Many commonly cultivated plants and trees are poisonous.

Poisons. There is no satisfactory definition of P. which will embrace all the examples, but substances which on entering the body and being in any degree absorbed produce death or injure health, though not by mere mechanical derangement, are poisonous. Introduction to the body may be by the mouth, by injection, or by absorption through the skin. Further, a poisonous substance is usually considered such by virtue of its own inherent qualities. Most drugs are poisonous if the dose is large enough, and the possibility of deciding a commonly injurious dose might form the basis of definition, were it not that different constitutions react with marked difference, and the dose may be increased by habitual taking. P. have been known and used for a very long time, and in particular the Borgias are reputed to have reduced poisoning to a 'fine art.' Classification may be according to source: vegetable, animal, or mineral; or to chemical nature: organic inorganic, acid, alkaloid. Blyth employs the following classification: Poisonous cases; P. capable of separation by distillation; alkaloids; P. extracted with alcohol; P. derived from animal substances; the oxalic acid group; inorganic P. A common classification is: narcotic, corrosive, irritant, convulsant. Narcotics produce giddiness, drowsiness, headache, disturbance of the sight, paralysis of the voluntary muscles; they may act specially on the brain and spinal cord, and may at first produce excitement. Opium, henbane, chloral, chloroform, ether, are examples. Corrosives, such as spirits of salt, stain and blister the lips and mouth, burn the

throat so that breathing and swallowing are affected. Vomiting, diarrhoea, and intense stomache pain ensue. Corrosive perforation, gangrene, and perforation of the alimentary tract to a varying distance are found. Irritants include oxalic and tartaric acids, ammoniac, white and yellow arsenic, mercury salts, sugar of lead, copper arsenic, blue vitriol, verdigris, phosphorus, croton oil, various zinc, antimony, and iron salts, such as green vitriol, cantharides, etc. In continued small doses they cause indigestion, occasional vomiting, discomfort after food, general illness, and wasting. Convulsants such as strychnine create spasms of the throat and limbs and trunk, the breathing being difficult, the jaws and fists clenched. Death is due to suffocation or exhaustion, but consciousness is not affected. Among cumulative P. are the salts of mercury, antimony, lead, trional, strychnine, and digitalis. Certain gases are poisonous; carbon monoxide, carbon dioxide, hydrogen sulphide, coal gas, arsine, are among these. Accidental or unintentional poisoning is often due to fungi mistaken for mushrooms, yew berries, mountain-ash berries, laburnum seeds, foxglove, deadly nightshade, hemlock, privet, thorn-apple, monkshood, etc., among plants. Tinned meats, shell-fish, sausages, fish, etc., give rise to ptomaine poisoning. Phosphorus poisoning is occasional in the manuf. of matches; lead poisoning, with blue line on the gums and wrist-drop, in the manuf. of lead-glass. Arsenic has been mistaken for sugar; carbolic, oxalic, prussic acids, are, through inadvertence, sometimes taken, as also overdoses of sleeping draught. Opium smoking and laudanum drinking (see DR. QUINCEY) become a habit which leads to greater and greater doses and to grave moral as well as physical degeneration. White arsenic is taken by mountaineers of Syria to add to endurance, and by some women for the complexion. Injections of morphia to relieve pain or to induce sleep, etc., are used regularly. Strychnine is useful in small doses as a tonic, and digitalis is employed in diseases of the heart. One S. Amer. arrow poison, curare, is now employed in medicine for its relaxing effect on the muscles, e.g. in anæsthesia and in the treatment of tetanus.

Treatment.—In narcotic poisoning emetics should be given; a table-spoonful of salt or mustard in warm water; ipecacuanha wine, a table-spoonful every two or three minutes; half a tea-spoonful of sulphate of zinc in a wineglassful of water. The throat may be tickled with a feather, or the finger passed to the back of the mouth. Meanwhile the patient should be clothed warmly, and hot things applied to the feet and over the heart. Cold water dashed in the face will rouse from stupor. After the emetic has acted well, plenty of strong coffee should be given. In the case of opium, laudanum, morphia, morphine, recognised by pin-point pupils, administer emetic, rouse from stupor; it is necessary to keep the patient walking long after he seems all right;

strong coffee should be given frequently from the first; potassium permanganate is an antidote. Wherever there is great prostration stimulants are given; when breathing is slow or shallow, it is advisable to apply artificial respiration. Emetics should not be given for chloroform poisoning. For irritant poisoning, if an acid has been taken, alkaline substances should be given such as magnesia, powdered chalk, whiting, carbonate of soda, washing soda, soap, plaster scraped from the ceiling and mixed with milk. After neutralising the acid, the pain can be soothed by administering milk, white of egg, flour and water, thick barley-water, linsed tea, olive oil, yolk of egg. For alkali poisoning vinegar, citric acid, lemon-juice and water, tartaric acid, are administered. Emetics are never given for poisoning by alkali or acid. Carbolic acid poisoning should, however, be treated by emetics as well as soothing drinks. Coal-gas poisoning: the patient should be taken into the fresh air; windows should be opened or broken; clothing of neck, chest, and waist should be loosened; if the patient is unconscious cold water can be dashed in the face. Artificial respiration should be applied, and oxygen given if available. In any case the doctor, who may apply the stomach pump, should be sent for. Injected P. require counter injections. For further specific remedies see ANTIDOTE. For poison gas see CHEMICAL WARFARE.

See J. Ogier, *Traité de chimie toxicologique*, 1899; C. Vibat, *Précis de Toxicologie*, 1900; E. W. Dwight, *Toxicology*, 1905; M. Takayama, *Beiträge zur Toxicologie* (Gegal), 1905; R. A. Witthaus *Manual of Toxicology*, 1911; and A. W. Blyth, *Poisons* (5th ed.), 1920.

Poisson, Jeanne Antoinette, see POMPADOUR, MADAME DE.

Poissy, tn. of the dept. of Seine-et-Oise, France, on the R. Seine, 10 m. N.W. of Versailles. It was the scene of a conference between Rom. Catholics and Protestant in 1561. Iron and steel are produced. Pop 8000.

Poitiers, Diana of, see DIANE DE PORTIERS.

Poitiers (formerly Poitiers, from the Lat. Pictavium), cap. of the dept. of Vienne, France, 60 m. S.W. of Tours, is built overlooking the streams of the Boivre and the Clam, which meander round its base. The tn. contains a twelfth-century cathedral (St. Pierre) and two anc. churches, St. Hilaire le Grand and St. Radegonde, the latter containing the tomb of the saint, whose shrine was once a place of pilgrimage. Other notable buildings are the *hôtel de ville*, the Palais de Justice, the univ., and the library. There are manufs. of textiles, gloves and hosiery, and brewing. In and around P. are numerous Celtic and Rom. antiquities, including an amphitheatre and a triumphal *æon*. The main interest of the tn. centres on its historical associations. Not far from here Clovis defeated and slew Alaric II., the Visigoth king, in A.D. 507, and Charles Martel defeated the Moors in A.D. 732. Near here, also, in

1556, Edward the Black Prince, with about 14,000 men, totally defeated the Fr. army of 60,000 men under King John, who with his son were taken prisoners and brought to England. Pop. 41,000.

Poitou, former prov. of W. France, is now mainly comprised in the depts. of Deux Sèvres, La Vendée, and Vienne, and was divided into two parts, Upper and Lower P. Cap. Poitiers.

Poker. This is a game essentially Amer. in origin. It has sev. variations—'Draw,' 'Straight,' 'Stud,' and 'Whisky.' 'Draw' P. appears to be the most popular form, and is practically synonymous with P. In 'draw' P. a single pack of cards is used. Five cards are dealt to each of generally half a dozen players, with the right to 'draw' five more. The object of the game is to make the best 'hand' according to certain combinations of cards. The degrees of these combinations in their order of value are: (1) A *straight flush*, i.e. a sequence of five cards. As between two sequences, the player whose sequence begins with the higher card has the preference. The ace may be regarded either as the highest or the lowest. (2) *Four*, i.e. four cards of the same denomination with one indifferent card, the higher four having preference. (3) A *full*, i.e. three cards of the same denomination and a pair. (4) A *flush*, i.e. any five cards of the same suit. (5) A *straight*, i.e. five cards in sequence, but not of the same suit. (6) *Three*, i.e. three cards of like denomination, with two indifferent cards. (7) *Two pairs* with an indifferent card. (8) A *pair* with three indifferent cards. (9) *Highest card*, where no hand has any one of the previously enumerated combinations. As between pairs or sequences in opposing hands, the highest wins. Where each holds two pairs the two best are compared, and the highest wins. Where pairs are equal the highest indifferent card wins. If the equality is absolute the pool is divided.

A certain amount is fixed upon as the limit to the initial stake. One player starts the pool with a preliminary stake called the 'ante,' which must not exceed half the limit. Such preliminary stake is made without looking at the hand, and is for that reason also called a 'blind.' The player who has the privilege of putting up the preliminary stake is the 'age,' or person who sits on the left of the dealer; the deal passes from right to left. A player whose hand is so bad as to offer small chance of winning may 'pass,' i.e. go out of the game altogether for that hand. If not he puts in the pool *double* the stake put in by the 'age,' and the other players may do the same in rotation. When the turn comes round to the 'age' he may either put into the pool an amount equal to his 'blind' or pass. If, however, the 'age' has put in as the 'ante' the minimum, the next player may if he chooses first make good the 'ante' by doubling it and then 'raise,' i.e. offer a higher stake not exceeding the limit. Each subsequent player who wishes to go still better must first put in as many

counters as his predecessors and then something in addition. When under these circumstances the turn comes round to the 'age' again, he may regain the lead by putting in the same amount less one (his 'ante') as that of the highest stake. After this bidding comes the time for 'drawing' cards. After the 'draw' is completed, betting is resumed. The 'age' has the right of reserving his stake until the other players have declared whether they will stake more. Where a player at this stage does not elect to stake higher than his neighbour, but yet wishes to remain in the game, he says 'I'll see you'; this simply makes good the last 'raise.' When this last round of betting is over the players turn up their cards; the best hand according to the classification above wins and takes the pool. In the ordinary 'draw' P., where the whole table declines to 'go in,' the 'age' reproaches his 'ante' and the deal passes to the next player, no one being any the worse off. In the 'Jack Pots' variety of 'draw' P. each player, in such a contingency, puts up an equal amount to the 'ante,' and the cards are dealt by the next player. There is no 'age,' but if any player happens to hold a pair of jacks, or anything better, he opens 'the jack-pot,' by putting down any stake he pleases. The other players in rotation must either make this good or go out. Any one may 'raise.' This goes on until one player says he will 'see' his predecessors. The cards are then declared and the best hand wins.

'Straight' P. or 'Bluff' differs from 'draw' in these particulars: (a) The 'age' has no privilege; (b) the deal passes to the winner of the pool, and not in rotation; (c) a player who has passed is not excluded altogether unless some other player has raised in the meantime; (d) each player puts up an amount agreed upon beforehand by way of 'ante'; and (e) there is no 'drawing,' each retaining the first cards dealt him.

Other games are 'stud,' a species of 'straight' P., and P. patience.

Poker-drawings, or Pyrography, decoration of wood by partially burning or charring. The design is thus produced in various shades of brown and black. It may be executed with small heated skewers of various sizes, with an electrically heated platinum point, with a blow-pipe, and with a hollow platinum point heated internally by vapourised benzoline. Woods generally chosen include cedar, elm, and chestnut. Leather and velvet materials are often decorated.

Pokhur, or Pushkar, holy tn. of Rajasthan, India, near Ajmer, containing the only temple to Brahma in India. Pop. about 5000.

Pola, seaport of Yugoslavia, in Istria. It was the chief naval station of Austria-Hungary before the First World War. Italy obtained possession of it at the peace treaties, and until the Second World War it was an It. fortified seaport and important naval station. In 1947 it passed to Yugoslavia. It occupies an eminence overlooking the Adriatic Sea, 38 m. S. of Capo d'Istria. The bay is well sheltered

and is spacious enough to accommodate the largest fleet. The tn. is surrounded by bastioned walls, and is overlooked by the citadel, by which it and the bay are commanded. Under the It. it was a bishop's see, and there is a fine cathedral. It is a centre of trade and shipbuilding is carried on. P., a very anc. tn., is said to have been founded by the Colchians, who were sent in pursuit of Jason. It was destroyed by Julius Caesar, but rebuilt by Augustus at the request of his daughter Julia, of which account it was named *Pietas Julia*. It contains interesting Rom. remains, among which are a well-preserved amphitheatre, 436 ft. long and 346 broad. A temple and sev. anc. gates and a triumphal arch are also extant. It suffered during the wars with the Venetians and Genoese in the thirteenth and fourteenth centuries and from bombing in the Second World War. Pop. (1936): 34,000 (tn.); 12,000 (com.).

'Polacca,' It. merchant vessel at one time used on the E. waters of the Mediterranean. It was built with three masts each made in one piece, square rigged, with neither tops, caps, nor cross-trees, and with square or lateen-shaped sails.

Pola de Lena, see LENA.

Poland, republic of Europe, lying S.E. of the Baltic, with an area of 121,131 sq. m. It has few natural boundaries. In the W. the provisional boundary follows the Oder-Neisse line; in the E. the boundary passes through the former Ger. prov. of E. Prussia, which is now divided between Russia and P., to follow the Curzon line (q.v.), which runs S. behind the R. Niemen to Brest-Litovsk and then follows the course of the R. Bug to the Carpathians, which mark P.'s S.W. frontier. The country is largely flat and low-lying, sloping down to marshland in the E. P.'s only mountainous region lies in the S.W., where the Carpathian range begins. In 1946 the pop. numbered 23,929,800, the largest tns. being Warsaw, the cap., with an estimated pop. (1948) of 606,400; Lodz, 576,000; Cracow, 307,400; Poznan, 297,000; Wrocław (Breslau), 241,000; Gdansk (Danzig), 161,000; and Bydgoszcz, 150,000. The country is divided into sixteen administrative provs. (*województwa*). These are Białystok, Gdansk, Kielce, Cracow, city of Lodz, prov. of Lodz, Lublin, Olsztyn (Allenstein), Pomorze, Poznan, Rzeszów, Śląsk (Silesia), Szczecin (Stettin), city of Warsaw, prov. of Warsaw, and Wrocław.

Communications.—The Polish state railways extend over 14,407 m. national gauge and 2283 m. narrow gauge lines. There are over 4000 m. of inland waterways, including 2350 m. of navigable rivers, and 510 m. of canals. The chief ports are Gdansk, Gdynia, Szczecin, Kolobrzeg (Kolberg), and Elbląg (Elbing). Elbląg is an inland riv. harbour. The Polish mercantile marine, as a gross tonnage of about 200,000 tons. There is a national air-line ('Lot') which has a number of airfields, the most important being at Poznan, and internal air traffic increases annually. Most aircraft in use are of

Russian manuf., and many pilots are Russian trained.

Agriculture and Industry—Before the Second World War P was mainly agric., the chief crops in order of average being rye, potatoes, oats, wheat, barley, and sugar beet. The shifting of the W boundary to the Oder-Neisse line after the Second World War resulted in the acquisition of vast industrial resources. P also gained by frontier changes a dense transport network and a longer coast line. The basis of the national



Polish Embassy

POLAND THE TATRA MOUNTAINS
The Much peak at M. K. Ok. S. S. S.
I. Lake

economy was thus transformed. In 1948 the gov. announced a six-year plan for agriculture and industry, both were to be modernised and developed, but particular stress was laid on the development of industry, and a future P was envisaged which should have a well-balanced agric. and industrial economy. A beginning was made in land collectivisation, but in 1948 the agric. structure had not been greatly affected by agrarian reforms, and in addition the land was still suffering from the loss of labour and livestock resulting from the Second World War. As well as dividing the *latifundia*, land reform has increased the size of the small farms, by combining dwarf holdings to make economic units. Industrial progress was more rapid. The major industries were nationalised or subjected to rigorous state

control and a planned economy imposed on all branches of industry. P's mineral resources are considerable, being found mainly in Silesia. There are large bituminous coal deposits, with a yield of over 10,000,000 tons in 1947 and of nearly 4,000,000 tons of coke. Other minerals are iron ore, potash, salt, crude petroleum, zinc, steel and natural gas. In 1947 128,000 tons of crude petroleum, 467,100 tons of pig iron and 1,579,100 tons of raw steel were produced. Other leading industries are cotton, woollen yarn, paper making, and chemicals. The centres of industry are as follows: Silesia and Kattowitz for coal, iron and steel, Bialystok for textiles, Warsaw, Lodz, Bydgoszcz, and Poznan for metallurgical industries, and the Carpathians for naphtha and oil refining. In 1947 P's largest single customer was Russia, 28.7 per cent of Polish exports went to the U.S.S.R., whence came 26.3 per cent of her imports. Britain was the fourth largest importer, supplying 9 per cent of the Polish import total. In the same year 1 per cent of Polish exports went to Britain. In Jan. 1949 a five-year trade pact was signed between P and Britain under which P should export to Britain goods valued at £1,000,000.

Government and Justice—P has been a republic since 1918. In Jan. 1947 general elections were held for the first time since the Second World War. These resulted in an overwhelming victory for the Communist-Socialist bloc (Democratic front). The *Sejm* (Diet) thus elected passed an interim constitution in Feb. 1947. Under it power is divided between the *Sejm*, the executive, and the president, who has a wide prerogative similar to that allotted him under the 1921 constitution. The constitution brought into existence a council of state, consisting of the president, the presidents and vice-presidents of the *Sejm*, and the chairman of the Supreme Court (member of the body responsible for state accounts). The *Sejm* meets biennially, but in the intervals between sessions it may authorise the gov. to govern by decree except in matters relating to fiscal changes or conscription. There is universal suffrage and a system of proportional representation is used. Justice is administered through a supreme national tribunal, a supreme court, nine courts of appeal, eight special criminal courts, fifty-eight circuit courts, a number of labour courts, and some hundreds of city courts. In 1947 3,500 local citizens' courts were established, and there are also special courts to try 'fascists and traitors'. The members of the security police are not known. The system of maintaining a separate security police force apparently derived from the U.S.S.R. is modelled on Russian lines. Its function is to prevent counter-revolution. In 1947 there were over 100,000 reserve police, a force recruited to assist the regular police force.

Education and Religion—There is free and compulsory elementary and secondary education up to the age of eighteen. In 1947 there were 3,589,763 pupils at the

elementary and secondary schools, and 140,000 pupils at secondary professional schools. There are a large number of technical, agric., and commercial colleges. In the same year there were eleven univs. and fifteen other institutions of univ. rank, with nearly 80,000 students of whom 25 per cent were women. The univ. of Krakow is the most important, with over 10,000 students in 1947. The other prin. univs. are at Warsaw, Lodz, and Poznan. There is no state church but Rom. Catholicism is the predominating religion. In 1939 65 per cent of the pop. were Rom. Catholic and there was a large Gk. Orthodox minority, living chiefly in the region which has been, since 1945, incorporated with the U.S.S.R., with an archbishopric at Lwow. Present religious statistics are not known owing to the great territorial changes which have taken place since the Second World War; the 1946 census did not deal with religion.

Defence.—For defensive purposes, P. is divided into six areas, Lublin, Poznan, Cracow, Slask, Warsaw, and the coastal region. There is a large infantry training centre at Rembertow and work has begun on the organisation of a military academy and a high milit. college. Army strength is estimated at over 200,000. In 1947 the army was still to some extent officered by Russians, and the present Polish Army is closely modelled on Red Army lines, including its political training, and is equipped with Russian arms, tanks, and artillery. Military leaders have repeatedly emphasised that in the case of war the two armies would be able to operate together. In 1949 the Polish-born Soviet general Konstantin Rokossovsky (q.v.) was appointed minister of national defence in the Polish Gov. The Polish Navy consisted in 1947 of 2 destroyers, 4 submarines, 13 minesweepers, and 12 submarine chasers. There is a large air establishment.

History.—The Poles are a branch of the Slavic (q.v.) family. The name appears first in hist. as the designation of a tribe, the Polani, who dwelt between the Oder and Vistula. Polish historians claim that they can trace P.'s hist. back as far as the fourth century, but the lists of rulers which they give are probably those of separate tribes and not of the combined race now known as Poles. At any rate, the hist. of P., previous to the middle of the ninth century, is so intermingled with fables as to be very untrustworthy. Ziemowicz, said to be the second monarch of the Piast dynasty, is considered to be the first ruler whose hist. is to any extent reliable, and it was not till a century later, when his descendant, Mieszko I. (962-92), occupied the throne, and became a convert to Christianity, that P. took her place as one of the political powers of Europe. Mieszko divided his dominions among his sons, but one of them, Boleslas I. (992-1025), surnamed the 'Great', soon reunited the separate portions, and extended his kingdom beyond the Oder, the Carpathians, and the Dniester, and sustained

a successful war with the Emperor Henry II. of Germany, conquering Cracovia, Moravia, Lusatia, and Mtsnia. To the E. he extended the Polish frontier as far as Kiev. He is regarded as the real founder of the Polish state. After a period of anarchy he was succeeded by his son, Casimir (1034-58). Boleslas II. (1058-81) who succeeded Casimir, murdered the bishop of Cracow in 1079. P. was then laid under the papal interdict, and he is said to have committed suicide (1081). Boleslas III. (1102-39), an energetic monarch, annexed Pomcrania, defeated the pagan Prussians, and defended Silesia against the Ger. emperors. A div. of his kingdom among his sons caused much internal dissension, under cover of which Silesia was severed from P., though still nominally subject to it. Ultimately Casimir II. (1177-94) reunited the severed portions, with the exception of Silesia and established on a firm footing the constitution of the country.

The Mongols swept over the country in 1241 bringing it near ruin, and defeating the Poles in a great battle near Wahlstatt. P. began then to decline; various dists. were ceded to the margraves of Brandenburg, while many dists. began to be colonised by Gers. Numbers of Jews, persecuted in W. Europe about this time, took refuge in P. Wladislas (1305-33), surnamed Lokietek (the Short), again restored unity to the country.

Judicial abuses and all illegally acquired privileges were abolished, and the first Diet (1331) assembled for legislative purposes. In conjunction with Gedymin, grand duke of Lithuania, a vigorous and successful war was carried on against the Teutonic Knights. Wladislas's son, Casimir III. the 'Great' (1333-70), greatly increased the power and prosperity of P. by pursuing a peaceful policy, amending the laws and consolidating his territory by profitable exchanges with the neighbouring powers. With Casimir the Piast dynasty became extinct, after 516 years, according to the old Polish chroniclers. His nephew, Lewis the Great, king of Hungary, succeeded him, by the will of the deceased monarch and the election of the Diet, but during his reign P. was treated merely as an appanage of Hungary.

On his death without male heirs, the crown fell to Jagello (Wladislas IV.), grand duke of Lithuania, the son-in-law of Lewis, who founded the dynasty of the Jagellons (q.v.) (1386-1572), and for the first time united Lithuania and P., thus doubling the extent though not the pop. of the kingdom. However, his successor, Wladislas V., was acknowledged only in P. proper, the Lithuanians preferring the rule of the younger son, Casimir. Wladislas was also chosen king of Hungary, and fell at the battle of Varna, being succeeded in P. by Casimir IV. (1427-92), who again united it to Lithuania. Casimir recovered W. Prussia from the Teutonic Knights, and compelled them to do homage for E. Prussia. Sigismund I. (1505-48), surnamed the Great, the fourth son of Casimir, gave P. great

prosperity; he was, however, forced into a war with Russia, in which he lost Smolensk, but he was partly compensated by obtaining lordship over Moldavia. His son, Sigismund II. Augustus, was a worthy successor. During his reign Lithuania was finally joined indissolubly to P., and from this time there was to be but one Diet for the united realm. The pop. almost doubled itself under the two Sigismunds, but this dynasty, under whom P. profited greatly, ceased with them. The warrior class decided to preserve their own freedom by making the monarchy elective. The first elective monarch was Henry of Valois (III. (q.v.) of France), who, however, soon abandoned the throne for that of France, and was succeeded by Stephen Batory (1575-88), *voivode* of Transylvania, a man of energy and talent, who carried on war successfully against the Russians. His successor, Sigismund III. (1586-1632), who was succeeded by his sons, Wladislas VI. (1632-48) and John Casimir (1648-68), was of the Vasa family, and was the crown prince of Sweden; but his election, far from cementing a bond of union between the two countries, only embittered former dissensions. These three Swedish monarchs had neither talents for governing nor characters and sentiments congenial to a warlike nation. But the Polish armies, though, like the rest of the nation, neglected, were victorious everywhere; the Swedish and Muscovite armies were both annihilated; Moscow was taken, and the Russians completely defeated. During the reign of this dynasty, Wallachia and Moldavia were snatched by the Turks from under the Polish protectorate; Livonia with Riga was conquered (1605-1621), along with part of Prussia (1629), by Sweden; and Brandenburg established itself as an independent power.

In the reign of John Casimir, P. was attacked simultaneously by Russia, Sweden, Brandenburg, the Transylvanians, and the Cossacks. The country was entirely overrun, Warsaw, Vilna (Vilno), and Lemberg taken, and the king compelled to flee to Silesia. Gen. Czarniecki, however, succeeded in defeating all P.'s enemies, and they were driven from the country. But in the subsequent treaties, Ducal or E. Prussia was wholly given up to Brandenburg, almost all Livonia to Sweden, and Smolensk, Severia, or Tohernigov, and the Ukraine beyond the Dnieper were given to Russia. Michael Wisniewski (1668-71), the son of a famous general, was elected as their next monarch. A war with Turkey, concluded by an ignominious peace, was the chief event of his reign. After some dissensions concerning the election of a successor, John (q.v. Sobieski) (1671-96) was chosen, but his reign, though it brought military glory to P., did not improve internal administration. As Sobieski's successor, the prince of Conti was legally elected and proclaimed king, but the cabinet of Versailles allowed this splendid opportunity of becoming supreme in Europe to escape, and Augustus II. of Saxony, a

protégé of the house of Austria, entered P. at the head of a Saxon army, and succeeded in obtaining the throne. His war with the Turks restored to P. part of the Ukraine and the fortress of Kamienie, but that with Charles XII. brought nothing but misfortune. The war with Sweden was unpopular in P., in fact, the Poles of the E. provs. received Charles gladly; but his attempt to force upon them Stanislas Leszczynski as their king severely wounded their national pride. Augustus returned after the battle of Poltava (q.v.), his rival retired without a contest, a close alliance was formed with Russia, and the Russian troops who had campaigned in P. against the Swedes were, along with his Saxon army, retained. The Poles demanded their extradition, but in vain, and the Russian cabinet interfered (1717) between the king and his subjects, compelling both parties to sign a treaty of peace. This was the commencement of P.'s dependence on Russia, and her consequent obliteration as a great power.

The succeeding reign of Augustus III. of Saxony (1733-63) was of the same character; the gov. fell more and more under Russian influence, and its political relations with other countries gradually ceased. On the death of Augustus the cabinets of St. Petersburg and Berlin presented to the Poles Stanislas Poniatowski, who was totally incapable for such office, as their king. This led to a Polish bid for independence. The 'Confederation of Bar' (so called from Bar in Podolia) was formed by a few zealous patriots, an army was assembled, and war declared against Russia. Frederick the Great of Prussia, who had formerly gained the consent of Austria to a partition of P., now, in 1770, made the same proposal to Russia, and in 1772 the first partition was effected. The country now fully realised its danger, and classes which had long been divided began to unite. The Diet of the diminished kingdom laboured to amend the constitution and strengthen the administration. In this they were encouraged by Prussia, whose new king, Frederick William II., swore to defend them against Russia, but Prussia proving traitorous a second fruitless resistance to the united Prussians and Russians, headed by Joseph Poniatowski (q.v.) and Kosciuszko (q.v.), was followed by a second partition (1793), which the Diet were made to sanction by the threat of armed force. The Poles now became desperate; a general rising took place (1794), the Prussians were compelled to retreat to their own country, and the Russians were seven times routed; but then a new enemy appeared on the scene. Austria was chagrined at having taken no part in the second partition, and was determined not to be behindhand on this occasion. Her army accordingly advanced, compelling the Poles to retreat, and, fresh hordes of Russians arriving, Kosciuszko, at the head of the last patriot army, was defeated, and the sack of Praga, followed by the capture of Warsaw, finally annihilated the Polish monarchy. On the third and last partition (1795) King

Stanislas resigned his crown, and died at St. Petersburg in 1798.

The subsequent success of the Fr. against the Russians, and the tempting promises of the Emperor Napoleon to reconstitute P., rallied round him a faithful army of patriots, who distinguished themselves in the campaigns of the Fr. against Russia and Austria; but all that Napoleon accomplished in fulfilment of his promise was the estab., by the treaty of Tilsit (1807), of the duchy of Warsaw. On the fall of Napoleon the remnant of P. was granted a constitution which continued to 1830, its separate gov. lasting till 1864. Four years later P. became Russian ter., its name being erased from the map. Polish independence was regained after the First World War. Russian-P. was captured by the Ger., who promised independence and set up a regency council, a monarchy being intended. In 1918 a constituent assembly was called and on Nov. 9 a republic was proclaimed, recognised under the peace treaties. The boundaries of P. were: in the N. the Baltic Sea, E. Prussia, and Lithuania (fixed by the council of ambas., March 15, 1923); in the S. Czechoslovakia and in the S.E. Rumania; in the E. Russia, determined by the treaty of Riga, March 18, 1921; in the W. Germany, the Ger.-Polish frontier in Upper Silesia being decided by plebiscite. The corridor, called the prov. of Pomorze (the seaside) in official Polish usage, was given to P. in 1919 as an outlet to the sea. It passed across former Ger. ter., cutting E. Prussia off from the rest of Germany. It was a stretch of land connecting P. with the Baltic Sea, narrowing towards the coast (smallest width 10 m.), broadest at its base (60 m.). P. then had an area of 119,958 sq. m. consisting of sixteen cos.: (1) Central cos.: Warsaw and the city of Warsaw, Lodz, Kielce, Lublin, and Bialystok; (2) E. cos.: Wolyn, Polesie, Nowogrodek, and Vilna; (3) Meridional cos.: Cracow, Lwow, Stanislavow, and Tarnopol; (4) W. cos.: Poznan, Pomorze, and Silesia. The pop. was about 31,756,000, of whom 69 per cent were Polish and the remainder Ukrainian, Jewish, Ruthenian, Ger., etc. The provisional gov. under Maracewski collaborated with Marshal Pilsudski (q.v.), president, and by arrangement Paderewski, head of the Polish National Council in Paris, returned to P., becoming Premier in Jan. 1919. In Dec. he resigned in favour of Skulski. In war with Russia the Poles captured Kiev, May 8, 1920, but a Russian counter-offensive was only checked outside Warsaw. A peace conference opened at Minsk on Aug. 17, but hostilities continued until P. concluded an advantageous peace at Riga on Oct. 12, 1920, ratified on March 18, 1921.

P. quarrelled with Lithuania over Vilna. Zelignowski seized the tn. unofficially for P., but the League of Nations intervened. Vilna eventually became Polish (Jan. 8, 1922). In 1921 the Upper Silesian plebiscite was carried out. A financial business gov. lasted under Ponikowski from Sept. 1921 to June

1922. General elections were held in Nov., after the passing of the electoral laws by the Constituent Assembly, while in the presidential elections (Dec. 7), Pilsudski refusing nomination, the Left party secured election of Narutowicz, who was assassinated (Dec. 16). Wozniczchowski became president, but ministerial crises during 1923 brought in the finance minister, Grabski, with dictatorial powers. In 1924 the budget was balanced and inflation stopped. Economic crises following financial rehabilitation caused Grabski's resignation, Nov. 13, 1925. Skrzynski, former foreign



E.N.A.

POLAND: A YOUNG GIRL OF LWICA

minister, formed a coalition ministry. In May 1926 a cabinet was formed by Witos, Peasants' party leader, whom Pilsudski opposed. A military stroke put Warsaw and President Wozniczchowski under Pilsudski's control (May 12). Pilsudski declined the presidency, which went to Moscicki, but on the fall of Bartel, Premier of the provisional gov., Pilsudski became himself Premier. Pilsudski's dictatorship was marked by improved foreign relations. In Sept. 1926 P. was admitted to the League of Nations. In Dec. 1927 the 'state of war' with Lithuania ended. P. adhered to the Kellogg Pact and the Russian protocol, agreeing to an E. European peace pact. On June 25, 1928, Pilsudski resigned, becoming minister of war in Bartel's Cabinet, which in April 1929 was succeeded by Switalski's 'Government of the Colonel'. The opposition of the *Sejm*, which at last met on Dec. 5, again brought in Bartel's ministry (Dec. 29). In foreign affairs a mutual agreement cancelling

war debts was signed with Germany (Oct. 3, 1929) and a provisional commercial treaty to end tariff war on March 17, 1930. On March 15 Bartel resigned and Pilsudski decided to crush the Centre and Left opposition in the *Sejm*, which was prorogued. Pilsudski assumed the premiership. General elections in which the opposition was intimidated were held in Nov., resulting in a gov. majority. Pilsudski then retired from politics.

A major cause of P.'s insecurity arose from the fact that the republic of 1918 contained large racial minorities carved out of the Polish-speaking parts of Austria, Germany, and Russia, totalling more than 10,000,000 people. These minorities caused friction between P. and her neighbours. She therefore relied increasingly on her alliance with France. Economic and social difficulties also caused unrest, though under Pilsudski these troubles were not apparent. In the succeeding period P. was ruled dictatorially by the military clique known as the 'Colonel's Group' in collaboration with the owners of large estates. In 1934 a non-aggression pact was concluded with Germany, which weakened P.'s ties with France. Under Pilsudski's successor, Marshal Smigly-Ridz, with Moscicki continuing as Premier, a new constitution was adopted, which, in effect, ousted all but non-partisan or gov. candidates from Parliament. A 'National Unity Movement' was estab. under Col. Koc in 1937 as a kind of totalitarian party, but the old parties, including Conservatives, Socialists, National Democrats, and Peasants, continued their activities outside Parliament and boycotted the election of 1938.

In 1939 P. still hoped for peaceful relations with Germany. It was known that Hitler regarded Danzig (now Gdanak) and also the corridor to the sea as part of the Ger. *Lebensraum* (f.r.) but it did not seem that Germany was prepared to go to war for them. However, the situation changed after the Ger. annexation of Bohemia in March 1939. Germany began to mass troops and P. was given a guarantee by Britain and France. The Polish foreign minister, Colonel Beck, negotiated an Anglo-Polish pact of mutual assistance, and Hitler annulled the pact of 1934. P. concluded a trade agreement with Russia, though she showed no eagerness to have that country as an ally. On Aug. 29 Hitler sent an ultimatum to P. and read out to the Brit. ambas. in Berlin a number of demands for acceptance by P. before midnight of Aug. 31; but the demands were never communicated to P. On Sept. 1 Ger. troops crossed the Polish frontier. P. was quite unprepared and no general mobilisation had been ordered. Of 2,000,000 first-line troops only one-third were in the field. Against the Ger. mechanised divs. P. could put only cavalry. The passes over the Carpathians were unfortified; the country was full of spies.

P. mistakenly tried to defend her strategically indefensible W. border. The

long S. border was protected by only two infantry divs. The Russian frontier was covered by a weak frontier guard corps. The Polish Air Force possessed only a few first-line aircraft. Germany concentrated 54 front-line divs. against P.'s 22 infantry divs. and 7 cavalry brigades. On Sept. 3 Britain and France declared war on Germany, but it was clear that they could tender no direct military assistance to P. Ger. forces overran Pomerania, Poznania, and Silesia, took Cracow, and, crossing the Polish corridor, seized Gdynia. By Sept. 12 Germany had conquered nearly all W. Poland. After a severe defeat at Kutno Polish forces retired on the line of the Rts. Vistula, San, and Narew, a good strategic position. But the gov. added to the confusion by leaving Warsaw, and a haphazard evacuation of the cap. began which resulted in a congestion of the roads and railways. On Sept. 17 Russian troops, violating the non-aggression pact, crossed the R. frontier. Attacked from the rear the defence of P. finally collapsed. By Sept. 20 the war was over, except around Warsaw, which stood a siege. Ger. bombers first appeared over Warsaw on Sept. 1, but a concentrated attack by sov. squadrons of the *Luftwaffe* did not begin until some days later. There was practically no defence, as P. only possessed about a hundred anti-aircraft guns and these were defending military positions. On Sept. 20 the Gers. demanded Warsaw's unconditional surrender. This was rejected, and fierce fighting occurred around the city. On Sept. 23 water and electricity supplies broke down. The next day Nazi bombers, flying in close formations, came over the cap. and began a ruthless and concentrated bombardment lasting from 8 a.m. to 10 p.m. The only buildings left undamaged were the military c-tabs., since the Gers. hoped to use these when the city was occupied; the residential quarters were systematically obliterated. On Sept. 22 Germany and Russia partitioned P. by agreement, Germany occupying 72,000 sq. m. in the W. and Russia 78,000 sq. m. in the E., with pops. of over 20,000,000 and 15,000,000 respectively. Vilna was added to Lithuania. Germany incorporated about 34,000 sq. m. of Polish ter. in the Ger. Reich. This included the W. provs. of Pomerania, Poznania, and Slask, and large parts of the provs. of Bialystok, Cracow, Lodz, and Warsaw. A reign of terror, aiming at extermination, then began. The Poles were driven out of whole cities, which were repopulated by Gers. brought from the Baltic states, Czechoslovakia, and Germany. Much property was confiscated. Any opposition by the Poles was answered by reprisals involving, frequently, mass killings. Jews from Germany, Austria, and Czechoslovakia were deported to a 'Jewish reservation' in Lublin prov., covering 9000 sq. m. and already inhabited by about 2,500,000 Poles who had to find room for the Jews. Russia in annexing E. Poland gave some semblance of legality in her action by holding plebisc-

cites. The results showed an apparently unanimous vote in favour of annexation.

Guerrilla warfare continued in various places until the end of the war. Moscicki, the president, resigned, and nominated Rackiewicz, Speaker of the Polish Diet, as his successor. The latter dismissed Smigly-Ridz for incompetence. Gen. Sikorski became Premier and commander of the Polish forces which were to be reorganised in London and Paris. About 10,000 Polish officers escaped to rejoin the forces in France and most of the Polish mercantile marine also escaped. In addition P. saved all her gold reserve, amounting to approximately £25,000,000.

At the end of 1940 Ger. colonists in P. numbered about 350,000. Over 1,000,000 Poles had been deported from the annexed area. Germany now began to exploit P. systematically. Having sequestered Polish property, the Ger. Gov. instituted an organisation of trustees (*Treuhänder*) with head offices in Berlin. Whole streets and even peasant holdings were confiscated; 500,000 Poles were sent forcibly to Germany as agric. labourers, and 100,000 were sent into Ger. factories. Intellectuals were arrested; 8000 univ. profs., schoolmasters, lawyers, and other professional men were put in prison. The contents of Warsaw Univ. library were burned. All Polish manuals of the Polish language and literature, hist., and religion were destroyed, to prevent the private continuation of these studies. Education for a slave-race was considered unnecessary. Ger. policy aimed at the rapid assimilation in the Reich of the incorporated area in both legislation and administration.

The Central Gov. was an area of 10,000 sq. m. extending to the Rta. Bug and San which was subject to a Ger. governor-general at Cracow. Originally the Nazis hoped to convert this part of Ger. P. into an autonomous residual state under a Polish puppet gov., but no Poles of any importance would collaborate. All Poles driven out of the annexed ter. were forced into this area, regardless of its capacity to absorb them. Public services were re-estab. here, but the Poles were admitted to them only in the lowest grades. Economic life was subordinated to the Ger. four-year plan of 1936. Most Polish goods were exported to the Reich. Russian P. was also divided into two parts, the S.E. provs. of Stanislawow, Lwow, Volynia, and Tarnopol being incorporated in the Ukraine and the N.E. provs. of Bialystok, Polesia, and Novogradsk in White Russia. Administration was nominally autonomous, but all important measures were enacted by the Moscow Gov. Russian methods in P. have been condemned as being as inhumane as those of the Nazis, if less sanguinary. Later events suggest that Moscow's overriding consideration was the defence of Russia against the Ger. attack which Stalin knew he would eventually have to meet, and that this necessitated the Sovietisation of P.

Throughout 1941 the central gov. remained a kind of colony where the Nazis

experimented with methods designed to enforce the Ger. 'New Order' (*g.v.*). To further the policy of suppression of the educated classes and the reduction of P. to a reservoir of slave labour the W. provs. suffered even more than the Central Gov. in 1941. By the end of the year nearly 100,000 Poles had been murdered and 150,000 were in concentration camps.

In the course of the campaign against Russia, begun on June 22, 1941, the Gers. drove the Russians out of the E. provs. of P., but the Russians had previously deported over 1,500,000 of the inhab. so that the country now occupied by the Gers. was in a state of extreme destitution. The Gers. incorporated the S.E. provs. in the Central Gov. and the N. provs., including Vilna, into an administrative unit called Ostland. The Poles abroad, however, continued to resist. A Polish ship took part in the raid on the Lofoten Is. in Dec. 1941. Polish airmen took part throughout the war in raids on Ger. ter. A new Polish Army was organised in Russia, numbering 150,000 men. Gen. Sikorski followed a policy of collaboration with Russia and resumed diplomatic relations in 1941. According to official Polish figures, some 200,000 Poles had fallen victim to Nazi executions or were in concentration camps by the end of 1942. But poverty, hunger, and exposure to cold caused the deaths of at least 1,500,000 more. To combat guerrilla resistance in the forests around Lublin, the Gers. organised mass deportations of Poles from this area in 1942, and there were widespread executions in the Warsaw and Upper Silesia regions. Ger. reverses that year on the E. front made it necessary also to organise a defence in depth in E. Poland against the Soviet forces. The Polish Jews were the victims of the most extreme brutality. Polish official figures give the figure of Jews killed in P. as over 1,000,000, and in addition vast numbers were brought from Europe for extermination.

Polish resistance remained strong, both inside the country and abroad. Part of the Polish Army organised in Russia was sent to the Middle E. under Gen. Anders, and fought in the Libva campaign. The Polish Army in Britain took part in the allied invasion of Europe, and another army, formed in Russia, fought alongside the Red Army, taking part in the liberation of Warsaw. On June 23, 1944, almost on the third anniversary of the Ger. attack on Russia, the Red Army broke the Ger. front in White Russia on both sides of Vitebsk, and soon afterwards, with the fall of Mordov, Minsk, and Polotsk, the Ger. front over a width of 200 m. had ceased to exist. The fall of Polotsk, freeing the way to Drinsk, was quickly followed by the capture of Molodetchno, pointing the way to Vilna. The Russian armies, surged towards Lithuania and Latvia and, at the other end of the line, extended their advance to the S. of the Pripiet marshes and occupied Kovel, on one of the routes to Warsaw. Vilna, with 5000 prisoners, fell on July 13, Pinsk on the 14th, Grodno

on the 16th. Lublin and Siedlce fell on July 24, Deblin, on the Vistula, on the 26th; Lwow, Bialystok, Stanislawow, Przemysl, Yaroslav, and Brest-Litovsk on July 27-28. Early in Aug., however, the Red Army had to halt, and for a time the Gers. rallied and beat back the Russian spearhead thrusts before Warsaw and E. Prussia. But winter fell before the Russians could retrieve their repulse E. of Warsaw, where the Polish resistance movement had organised a great insurrection in support of the advancing Soviet armies, only to be tragically disillusioned. For some weeks the Gers. offered an impressive façade of defence, but the façade was hollow. Radom, Warsaw, Lodz, and Cracow were all taken by the victorious armies of Marshal Zhukov and Marshal Konev by Jan. 19, 1945. Torun was reduced on Feb. 1, but Poznan was not captured until Feb. 23, when at length the Red Army was in possession of the whole of P. See further under EASTERN FRONT or RUSSO-GERMAN CAMPAIGNS IN THE SECOND WORLD WAR.

On April 21, 1945, a 20-year treaty of 'friendship, mutual assistance, and post-war co-operation' between the Soviet Union and P. was signed in Moscow by Stalin and Osobka-Morawski, Polish Premier in the Polish provisional gov., then at Lublin. The period immediately following the termination of hostilities was one of mounting political and social disorder in P. arising from the fact that the social structure of the country had been completely shattered and that the essential task confronting all Poles was to rebuild their whole economy. Confusion was enhanced by the forced immigrations E. and W. of large elements of the Polish and Ger. pops., displaced to conform the new delimitations of the Polish frontiers. These remained (1948) to be settled finally by the peace treaty with Germany, but, meanwhile, it had been agreed at the Potsdam conference (July-Aug. 1945) that some changes should be made to compensate for terr. occupied by Russia E. of the Curzon line. P. received part of the tier. E. provs. to the extent of over 40,000 sq. m., and into this region the Polish pop. of the provs. ceded to Russia migrated. The minority problem in P. thus disappeared after the Second World War. The Jews had been almost exterminated, the Russians absorbed into the Soviet Union, and the Gers. expelled beyond the Oder. Facing the great tasks of reconstruction in 1946 was a young and inexperienced administration headed by the 'Polish Provisional Gov. of National Unity.' The two groups which had joined during the Moscow negotiations to form this gov. remained distinct and independent. On the one hand there was the original 'Lublin' group, the actual regime, in which the Communist Polish Workers' party (*Polska Partia Robotnicza*) was dominant, in association with the Peasant party and the Democratic party. On the other hand there was Mikolajczyk's Polish Peasant party. Besides the support of his own party, Mikolajczyk had the goodwill

of sev. mixed elements, who adopted a negative attitude to the regime. The Polish Socialist party was non-belligerent rather than neutral, as it leaned heavily towards the Lublin group. Mikolajczyk's position was difficult; he was the leader of the opposition who had joined the Cabinet for a common purpose pending the general elections. The most important factor in the regime was the Polish Workers' party, which held most of the key positions in administration and economic affairs. But the political situation could only be clarified by a general election and the first election was not held until the beginning of 1947. Meanwhile foreign policy was strictly assimilated to that of Russia, and the Warsaw Gov. was scrupulous to avoid displeasing its great E. neighbour. The presence at this time of large numbers of Russian troops on Polish soil was, however, inimical to the growth of popular friendship for Russia and aggravated the tasks of the Polish Gov. Ultimately, when the elections were held, the 'democratic bloc' (mainly Workers' party) of pro-Russians obtained an overwhelming majority and the Peasant party of Mikolajczyk and other parties virtually disappeared. Mikolajczyk fled from P. The Polish Gov. of 1947 was not democratic in the W. sense, nor was the election of 1947 conducted on W. principles. But the majority of Poles appeared to have ignored these irregularities in their recognition of the undoubted efficiency of the gov. They had feared that a Mikolajczyk Peasant Gov. would be followed by a reactionary regime leading inevitably to internal strife. The Polish Communists gave the appearance at first of pursuing an independent policy; it was not until they were well estab. in 1948 and 1949, that their close ties with and dependence on the Soviet Union became obvious. In any case, Polish hatred and fear of Germany had tended to lessen the traditional Polish enmity with Russia.

By 1948 P. presented a remarkable picture of post-war recovery to the outside world. After the war Warsaw was a heap of rubble; Gdansk, Poznan, and Wrocław were also in ruins. But by 1948 Warsaw had become once more an animated, vital city. The banditry which was prevalent all over P. immediately after the war had been suppressed. P.'s rapid recovery owed much to the considerable industrial facilities which she acquired in Silesia and Pomerania, though these facilities had in many cases suffered severe damage during the war. Other factors in the Polish recovery were the efficiency of the gov. and the \$5,000,000,000 relief given by U.N.R.R.A. which had also supplied, in the first half of 1946, nearly 80 per cent of the total imports into P. of \$254,000,000; while in the second half of 1946 U.N.R.R.A. imports were valued at \$191,000,000.

In Dec. 1948 the Socialists merged with the Communists and the Polish United Workers' party was formed. This enjoyed almost complete immunity from pari. opposition, since the other four

parties also joined the gov. bloc. An extensive party purge, carried out at all levels throughout the country, and directed at elements opposed to a Marxist-Leninist state, even removed from office Gomulka, one of the leading Communists. After this P. began to mirror Soviet policy in every detail, and a campaign against the Church began. An increasing number of Polish intellectuals began to escape from the country, dissatisfied with the actions of the gov. In 1949 Marshal Rokossovsky's appointment as minister of national defence suggested that the links between Russia and Poland would become even firmer. Polish exiles reported that the gov. was attempting to enforce Communism with increasing ruthlessness.

Polish Language and Literature.—The Polish language is a W. branch of Slavonic and employs the Lat. alphabet, varying it with diacritical marks. Polish literature has influenced the literatures of Russia, Serbia, and Czechoslovakia, and is marked throughout the centuries by its clarity and depth of feeling. Early Polish writers, including Copernicus, wrote in Lat. P. also possesses a number of distinguished medieval chronicles, written in Lat. The *Chronicle of Martin Gallus* (c. 1110) is the most important. In 1475 the first Polish printing press was set up in Cracow, but Lat. was still used, and the first book in Polish was not written until the early sixteenth century. Polish literature proper began in the sixteenth century with the poet Nicholas Rev and the prose writer Orzechowski, while the Polish court of Cracow was mirrored in the works of Gornicki. The greatest figure of the Renaissance in P. was the lyrical poet, John Kochanowski, but the seventeenth century was marked in literature mainly by tracts, and evidences of foreign influence. The epic poet Potocki and the lyric poet Kochowski may be mentioned. The eighteenth century was a didactic age, in which writers such as Naruszewicz, a bishop, and Konarski, a priest, moralised against the evils undermining P. With independence gone, P. became in the nineteenth century the object of a romantic national literature. The greatest poet was Mickiewicz, whose poem *Pan Tadeusz* is the national epic. Krasinski and Slowacki were two other great poets of a lost nationalism. Polish novelists of the nineteenth century—Kraszewski, Korzeniowski, and Rzewski—were influenced by Scott, but their real tendencies were carried further by the greatest of Polish novelists, Sienkiewicz, author of *Quo Vadis?*, and his contemporary, Prus. Two later novelists, both born in 1868, usher in the modern contemporary novel. Reymont, the delineator of peasant industrial life, and Przybylski, a psychological analyst. Novelists who were famous between the two World Wars are Andrew Strug and Eugene Malaczewski. Meanwhile the Polish drama had been backward until the eighteenth-century comedies of Fredro appeared, and their excellence has not since been surpassed.

Many poets mentioned above attempted the drama, but the greatest poetic play is Wyspianski's *The Wedding* (1901). The younger dramatic poet, Rostworowski, must also be mentioned. The philosophic poet Adam Asnyk (1838-97) was also a writer of comedies and historical plays, as was the poet Rydel (1870-1918). The work of another poet, Marya Konopnicka (1846-1912), was humanitarian, but the release of the personality in Polish poetry was due to Przybylski, while the best living poet is Jan Kasprzowski.



Polish Embassy

CRACOW: THE GOTHIC WAWEL CATHEDRAL. The Renaissance Sigismund and Vasa Chapels (sixteenth and seventeenth century) are seen on the right.

(b. 1870), the translator of Shakespeare. Other modern poets include Leopold Staff, Edward Slonski, Julian Tuwim, and Casimira Ilakowicz.

Art.—Most of P.'s finest architecture is of the twelfth to fifteenth centuries. Before the Second World War Cracow possessed many of the finest historic buildings of this period, including the magnificent cathedral, begun in 1142. Medieval Polish architecture followed generally the W. European pattern, except in the E. , etc., but in detail some of the richness and fantastic decoration typical of E. European styles was assimilated. The latter Gothic shows increasing Ger. influence and Polish architecture after the sixteenth century though often

very fine, lacks national distinctiveness. Polish baroque owes much to Hungarian ideas, many baroque craftsmen being Hungarians, though the finest of them, Słomski, was a Pole. Polish classical architecture is modelled on Ger. styles, while the twentieth-century architecture shows marked Amer. influence. Polish medieval painting consists chiefly of church frescoes and religious illuminations; in these the mingling of E. and W. European characteristics is more clearly shown than in architecture of the same period, natural and stylised forms appearing side by side in the same painting. During the Renaissance Polish painting declined, but the patronage given to the arts from 1764 onwards by the last king of P. not only attracted many foreign artists, such as Jean Pierre Noblin, but also encouraged native exponents. Patrons were also found among the magnates and the wealthier townspeople, and P.'s paintings, china (Korzec, Cmiczow, Baranowka), tapestries, and embroideries became the pride of the nation at a time of political misfortunes. Among painters the names of Kucharski, Orłowski, Brodowski, Stattler, Wankowicz, and Micholowski may be mentioned. Jan Matejko (1838-93) was the finest exponent of the school of historical painters, which flourished in P. alongside the nationalist movement throughout the nineteenth century. Jan Chelmonski (1850-1914) expressed his nationalism by painting every side of contemporary Polish life as he saw it. Naturalism and symbolism inspired the work of the 'Young P.' artists, and a group of them, known as Sztuka, formed in 1895 when Julian Falat succeeded Matejko as president of the Academy at Cracow, followed Chelmonski. Their leader, Jan Stanislawski, is, with Falat, chiefly known as a landscape painter. Most outstanding of 'Young P.' artists was Wiczolowski (1832-1936). After the decline of sculpture at the Reformation there is little of note to be found until the middle of the nineteenth century, but since then artists like Dumkowski, Wittig, Karny, and Szymanowski have made famous a school which though dependent in origin on Fr. ideas, has evolved into something distinctively Polish. A large number of fine Polish buildings and works of art were destroyed or badly damaged in the Second World War.

Polish church music was particularly fine during the fourteenth and fifteenth centuries. In the sixteenth century Cracow was the centre of music in central Europe. When the nationalist movement began in the eighteenth century Polish composers began to incorporate the national songs and dances in their compositions. These dated back for centuries, in many cases, and had many E. characteristics; the rhythm was particularly distinctive. K. Kurpinski (1785-1857), M. Kamiński (1724-1821), and J. Elsner (1769-1854) were the earliest composers to use the national music as a basis for their compositions; Elsner was Chopin's teacher, and it was Chopin

who perfected the blending of national music and that which had international traditions. J. Paderewski (1860-1941) was P.'s leading modern composer.

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Polar Axis, axis of an astronomical instrument or an equatorial, which is parallel to the earth's axis. The term is used in connection with the mounting of a telescope; in the equatorial form of mounting the telescope can rotate about two axes; one, the P. A., directed towards the celestial pole and the other, the declination axis, at right angles thereto, in the plane of the celestial equator.

In mineralogy P. A. denotes a crystallographic axis with different arrangement of faces at the two ends of the crystal. Its presence may also be detected by the development of positive and negative terminal charges when the crystal is heated or cooled uniformly (pyro-electric effect). Examples of minerals with a P. A. and which reveal true pyro-electricity are tourmaline, blende, and diopase.

Polar Bear, see BEAR.

Polar Exploration, see ANTARCTIC OCEAN AND EXPLORATION; ARCTIC EXPLORATION.

Polar Front, term used in meteorology to describe a surface of discontinuity between polar and tropical air. The term was invented by the Norwegian meteorologists, V. and J. Bjerknes, for the discontinuity often observed dividing the air masses of a typical depression of temperate lat.; the P. F. can be traced in waves from one depression to another, the depression forming on a front of one depression being known as a secondary depression. The part of the P. F. in which tropical air overtakes polar air is called the warm front; the part in

which polar air overtakes tropical is called the cold front. See further under METEOROLOGY.

Polaris, pole-star; a Ursa Minoris, magnitude 2.1, situated (1950) 58' from the pole. There is a companion star 18' away and of the 9th magnitude, and an invisible attendant inferred from spectrographic observations round which P. revolves in four days. Distance about 400 light-years; candle power about 4000 times that of the sun. The function of pole-star is distributed among a number within a circle of 23½°. About 3000 B.C. a Draconis was not more than 10' from the N. pole; while 12,000 years hence a Lyrae will be within 5° of it.

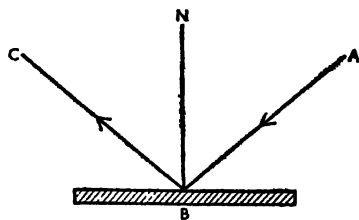
Polarisation, see CELL.

Polarisation, Elliptic, see ELLIPTIC.

Polarisation Microscope, instrument in which objects are viewed microscopically by polarised light (see POLARISATION OF LIGHT). The P. M. is extensively used in geology and mineralogy, and to an increasing degree in metallurgy, biology, and chem.; it greatly assists in the identification of minute particles of crystals, minerals, biological tissues, etc.

Polarisation of Light. Light is conceived as being caused by vibrations in the medium known as the universal ether. When these vibrations fall on the eye they give rise to the sensation of sight. These vibrations take place in all planes perpendicular to the direction of propagation of the light. When light is transmitted perpendicularly through a plate cut from a crystal of tourmaline in a direction parallel to the prin. axis the emerging light possesses a certain peculiarity in that if it is passed through another similar plate of tourmaline, the axis of which is at right angles to that of the first plate, the light becomes extinguished. If the two axial directions are parallel, light comes through. In intermediate positions some light emerges through the second plate. In this way the apparently paradoxical result is obtained whereby by placing two transparent bodies together, the resulting body is opaque. This leads to the conclusion that light waves consist of vibrations, transverse to the line of propagation. When the light has passed through the first plate, these vibrations are limited to one plane perpendicular to the direction of the ray, and then the light is said to be plane polarised. The second plate is only capable of letting through light corresponding to vibrations in one particular plane. Thus if the axial directions in the first and second plates are parallel to each other light can emerge. If they are completely crossed, i.e. inclined at 90°, there are no vibrations which the second plate can allow to pass. In intermediate positions there will be a 'resolved part' parallel to the direction in which the second plate allows light to emerge. Light may be polarised by reflection from the surface of a transparent body. Clearly polarised light may be detected by interposing a crystal of tourmaline in the path of the light and by rotating the crystal about the path as axis. If the light becomes duller by the rotation the light

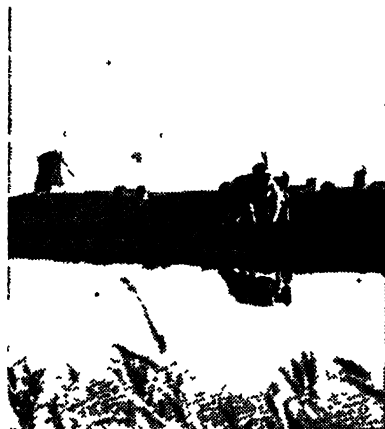
is partially polarised, whereas if no effect is produced, the light is not polarised. Polarisation by reflection may be noticed by observing light reflected from the surface of water or glass by means of a



tourmaline crystal. The brightness of the transmitted light will vary as the crystal is rotated. When light is reflected from a plane surface, the incident ray AB, the normal BN, and the reflected ray BC all lie in the same plane, called the plane of incidence, and the angle which the incident ray AB makes with BN, i.e. ABN, is called the angle of incidence. The vibrations of an incident ray take place in all planes perpendicular to its direction. Thus in the above diagram some of these vibrations are in the plane of incidence, while others are perpendicular to it. It is found that at a certain angle of incidence all vibrations in the plane of incidence are transmitted, while only those perpendicular to this plane are reflected; thus the reflected light consists of rays polarised in the plane of incidence, vibrations taking place only in the plane perpendicular to plane of incidence. The particular angle of incidence at which this takes place is called the angle of polarisation, and according to Brewster's law $\tan \theta = \mu$, where θ is the angle of polarisation and μ the refractive index of the reflecting medium. Polarisation is also exhibited in the phenomena of double refraction. Bartholinus discovered that a ray of light incident on a crystal of Iceland spar does not obey the ordinary law of refraction, but gives rise to two refracted rays (unless light travels along the trigonal axis, where there is only one). On looking through a crystal of Iceland spar over an ink spot, two images will be seen. If the crystal be rotated, one image called the ordinary image remains fixed, while the other rotates with the crystal. This image is termed the extraordinary image. Instead of the ink spot, suppose a well illuminated pin-hole is substituted and viewed through a crystal of calcite. If a crystal of tourmaline be placed between the eye and the calcite, it will be found that, for a certain position of the axis of the tourmaline, only the ordinary image can be seen. As the tourmaline is rotated about the path as axis, both images come into view, the extraordinary image becoming brighter until, when rotated through 45°, both images appear equally bright. Further

rotation diminishes the brightness of the ordinary image, until at 90° it is totally extinguished. Hence the rays of the ordinary and extraordinary images must be polarised in planes perpendicular to one another. Iceland spar may be used for polarising and for detecting polarised light.

The most important instrument in this connection is the Nicol prism, which is made of Iceland spar. A crystal of Iceland spar is cut perpendicular to its principal section and divided into two parts, which are then cemented together by a film of Canada balsam. A ray incident on the prism gives rise to two refracted rays,



Netherlands National Tourist Office

POLDER

Polder landscape in Holland

the ordinary ray being totally reflected out of the prism by the balsam, while the extraordinary ray is transmitted. Thus the ray transmitted is one which is polarised. In the Polarimeter one Nicol prism is used as the 'polariser' to produce the polarised light, and the other as the 'analyser' to examine it. The phenomenon of double refraction and resulting polarisation occurs in many other crystals besides Iceland spar. Another peculiar result is that when polarised light is incident on a crystal of quartz, the plane of polarisation is found to be rotated through a definite angle. Many organic and some inorganic substances exhibit this property either by themselves or in solution rotating the plane to the right or left. Those which rotate the plane to the right are called dextrorotatory, and those to the left levorotatory. This forms a basis of estimating the percentage strength of such a solution, the amount of rotation being proportional to the quantity of substance present in the solution. See also LIGHT; OPTICS.

Polarity of a body is the tendency which some bodies possess to set in a definite direction. This direction is often called the direction of the mathematical axis of the body. The property may be natural or it may be induced by external agencies. Thus a piece of lodestone tends to set in a definite direction, as also does an artificial magnet. In these and similar bodies, it also denotes the existence of two points possessing properties quite opposed to one another. Various other instances may be found in the study of electrostatics and current electricity.

Polar Light, see LIGHTS, NORTHERN.

Polar Regions, see ARCTIC OCEAN; ANTARCTIC OCEAN.

Polozyn Zdrój (Ger. Polzin), tn. of Poland, 35 m. from Kolobrzeg (Kolberg). There are chalybeate springs near by. Pop. 5300.

Polder, name given in the Netherlands to the low-lying, marshy coastal regions, which from the sixteenth century onward, by dint of unremitting toil, have slowly been reclaimed from the sea and converted into arable or pasture land. See under NETHERLANDS.

Pole, de la, name of an illustrious family in Eng. hist.

William de la P. (d. 1366), merchant of Hull, who advanced loans to Edward III.

Michael de la P. (11330-89), first earl of Suffolk, a son of the above. As chancellor of England and trusted adviser to Richard II, he aroused the jealousy of lords and commons, and in 1387 was obliged to seek refuge in Paris, both his estates and life being declared forfeit.

William de la P. (1396-1450), first duke of Suffolk, compassed Henry VI.'s marriage with Margaret of Anjou, and the disgrace of Humphrey, duke of Gloucester. He was assassinated for having, according to parliament, 'sold the realm to France.'

John de la P. (11461-97), earl of Lincoln, a loyal supporter of Richard III., whom he was ambitious to succeed. The leader of Lambert Simnel's conspiracy, he died at the battle of Stoke.

Sir Edmund de la P. (14721-1513), earl of Suffolk, brother to the above. A descendant of Edward IV., he was executed by Henry VIII. because of his dangerous nearness to the throne.

Richard de la P. (d. 1525) brother of the above. He aspired to the throne, but died at Pavia, where he fought for Francis I.

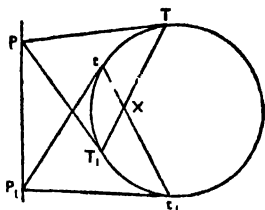
Pole, Matthew, see POOLE.

Pole, Reginald (1500-58), cardinal and archbishop of Canterbury, b. at Stourton Castle, Staffs, son of Sir Richard P. and Margaret, countess of Salisbury, and educated at Magdalen College, Oxford, later studying abroad until 1527. On his return he was given the deanery of Exeter, and might have at once secured high preferment if he had expressed his approval of Henry VIII.'s divorce. P., however, retired abroad. In 1536 he wrote *Pro Ecclesiasticæ Unitatis Defensione*, in which he formulated his views on eccles. affairs, with special reference to Henry VIII.'s conduct; and in the same year the pope made him a cardinal.

In 1540 he was one of the three legates appointed to open the council of Trent. P. was one of a number of prominent churchmen who worked hard to effect a reconciliation with the Protestant theologians, and was at one time suspected of heresy. He came again to England in 1554 as papal legate, and two years later was appointed archbishop of Canterbury. He died at Lambeth Palace on Nov. 17. It was the main object of his life to counteract the Reformation in England, and he is generally considered primarily responsible for the deaths of large numbers of Protestants in Mary's reign. See lives by J. Halle, 1910, and F. A. Gasquet, 1927.

Pole (measure of area), see **ROD**, **POLE**, or **PERRY**.

Pole and Polar. If any two points P and P₁ (see figure) are taken on a given straight line and tangents PT, P₁T₁; P₁T, PT₁ be drawn from them to a circle, the chords of contact TT₁, tt₁ meet in a fixed point X, called the pole of the line PP₁.



Conversely, if through a point any two straight lines are drawn to cut a circle and tangents drawn from the extremities of the chords resulting, the straight line joining the intersection of the pairs of tangents is called the polar of the point. Thus in the figure X is the pole of PP₁, and PP₁ the polar of X.

Polecat (*Mustela putorius*) quadruped belonging to the weasel family, Mustelidae, and to the same genus as the stoat and ermine. The Lat. adjective *putorius*, derived from *putere*, refers to its fetid smell, which probably accounts for its never being tamed. The common European variety is 18 in. long, 5 in. being tail. White markings occur on the face, with its short ears and pointed nose, but otherwise its fur is dark brown above and black below. Its skin is called 'fitch' and makes excellent artists' brushes, but poor fur. The P. preys on poultry yards, and for that reason has been almost exterminated in the Brit. Isles. It lives also on mice, rats, rabbits, eggs, frogs, and pigeons. In winter it frequents deserted barns; in summer it prowls in the open or goes down rabbit warrens or fox-holes. Its young (from three to eight at a time) are born in the spring. Many regard the ferret as a domesticated P.

Polemo, or **Polemon**: 1. (c. 315-270 B.C.), son of the Athenian Philostratus, was persuaded to renounce his drunkenness and debauchery by Xenocrates's eloquence, and on the death of that philosopher took his place as master of the

Old Academy (315 B.C.), as an eminent Platonic philosopher. (2) The son of the rhetorician Zeno, was appointed in 39 B.C. to the gov. of a part of Cilicia by Mark Antony, and subsequently obtained in exchange the kingdom of Pontus. Although he opposed Augustus at Actium, he afterwards profited by that emperor's clemency, and was made king of Bosphorus after conquering that country. Was succeeded by his wife Pythodorus. (3) A sophist at Laodicea in Asia Minor, taught rhetoric at Smyrna, and won the reverence both of Hadrian and Antoninus Pius. His most famous disciple was Aristides. (4) Author of two books on physiognomy, was probably a Christian, and lived before Origen (d. A.D. 254). He describes the features and characteristics of the impudent and the talkative man, etc.

Poles, ends of the earth's rotational axis. The P. are known to be subject to slight variations; one due perhaps to meteorological causes is an elliptical movement of about 30 ft. diameter counter clock with a period of a year; the other, a circular movement in the same direction, and a diameter of about 26 ft. in a period of 428 days. The other movements, considerably greater, are of a different nature, and are due to procession (q.v.) and nutation (q.v.). The celestial Ps. are the two points on the celestial sphere where it is intersected by the prolongation of the earth's axis.

Polesden Lacey, property of the National Trust acquired in 1942, situated near Leatherhead, Surrey, England. In early documents P. L. appears as Polesden or Poul-down, the suffix Lacey being added in the late eighteenth century. The house built in 1821 took the place of a Caroline house of 1632 owned by Richard Brinsley Sheridan. Sheridan bought the property in 1797 as part of the marriage settlement of his second wife, Elizabeth Ozle. No trace of the original Caroline house now remains. Sheridan found the house in a dilapidated state and in fact called it a 'ruin,' but his ambitious plans for rebuilding came to nothing, probably owing to the increasing financial embarrassment of his later years. The only visible trace of his ownership to-day is the long terraced walk, which he greatly extended. On the base of one of the urns adorning the walk is a quotation from Pope's *Essay on Man*, which may have been inscribed in Sheridan's time. In 1821 there was built on the site of Sheridan's demolished house, a Regency villa, built to the design of Thomas Cubitt, in the neo-Grecian style, with an elegant Ionic colonnade on the S. front. Though the interior was completely altered in 1906, the exterior preserves something of the aspect of a villa of the Regency period and the main front facing S. with its Ionic colonnade remains much as when first erected. The house is famous for its setting crowning a ridge of the N. Downs. Its great beeches probably planted by Sheridan.

Pole-Star, see **POLARIS**.
Pole-Star Recorder, instrument invented by E. C. Pickering, consisting of a telescope camera. The pole-star, which

describes a small circle every twenty-four hours, owing to its distance of 58' (in 1950) from the pole, is photographed, and from its trace on the photographic plate the amount of cloudiness of the atmosphere at night is estimated. See STARSHINE CAMERA OR NIGHT-SKY RECORDER.

Polesworth, coal-mining centre, on the Anker, between Tamworth and Atherstone in Warwickshire, England. The church is partly Norman. Pop. 7,100.

Pollanthes (Tuberose), genus of bulbous plants (family Amaryllidaceae). *P. tuberosa*, the tuberose, a native of Mexico, bears fragrant white flowers in autumn and winter. Sev. varieties have been raised, including the double African, the tubers of which should be potted in the autumn, and the Amor, or pearl varieties, which are potted from Jan. to April.

Police. Some kind of compulsion has always been necessary in the most primitive communities for securing effective observance of law and order. The P. force, though the term is one of recent origin, probably originated in primitive Asiatic tribal customs, and evolved through those of central European tribes into one of its most developed historical forms, the tithing system of A.-S. England. In which the community was organised into groups each of ten families, who were collectively responsible for the observance of laws by each group member. The group representative was called the tithingman, and from him the evolution of the modern Brit. and Amer. policeman can be traced.

In England the tithingman became the unpaid, elected, or appointed par. constable of the eighteenth century. The failure of the latter to cope with the changed conditions resulting from the Industrial Revolution gave rise to a period in which, at first in London, and later throughout the country, uncontrollable crime and riots are acknowledged by contemporary writers to have menaced the existence of the state. An effective P. force was estab. in London by Peel's Police Bill of 1829, but the structure and detail of the organisation were conceived and planned by the two first commissioners, Col. Charles Rowan and Richard Mayne. The New, or Metropolitan P. became the model for the estab. later of prov. forces. These were the Bor. P. (Municipal Corporations Act, 1835), and the Co. P. (Rural Police Acts of 1839 and 1856). The first thousand of Peel's new P. began their patrol in blue tailcoats and top hats, on Sept. 29, 1829. An Act of 1839 enabled the metropolitan P. dist. to be extended to any par. within a distance of 15 m. (now 16) of Charing Cross. (See also METROPOLITAN POLICE.) The municipal bors. followed suit before many years had passed, and by the middle of the nineteenth century nearly all of them had estab. a paid P. force constituted as nearly as possible on the same footing as that of the metropolis. But even at that time the co. organisation remained archaic and defective, only a few of the quarter sessions courts availing themselves of their statutory powers under the Act of

1839 to institute a P. force for rural dists. This was remedied in 1856 by an Act which converted the *discretionary* powers of the justices into compulsory powers; which powers of appointment and discretion have by the Police Act, 1890, been transferred to a standing joint committee composed of an equal number of justices and members of the co. council.

The metropolitan P. are the only exception (apart from the railway P. and similar bodies) to the principle of local control which characterises the Brit. P. organisation and sharply differentiates it from the state-controlled P. of continental countries. Outside Greater London the P. are administered by a local authority, known as 'the police authority' while, as indicated above, the co. P. authority is the standing joint committee. In the bors. it is the watch committee of the tn. council. The metropolitan P. are under the control of the home secretary and its prin. officers are appointed by the Crown. State control or nationalisation of the P. forces has often been urged since the passing of the County Police Act, 1938, and that local independence and diversity of control has drawbacks is obvious, particularly as regards the detection of crime. The principle of nationalisation has lost most of its supporters. In 1949 the obvious defects of small police authorities and small local forces were being remedied by many local amalgamations.

Under the Special Constables Act of 1831 special constables might be appointed only in the event of tumults and riots. They were employed with success during the Chartist alarm of 1818, the Fenian disturbances of 1868, and the railway strike of 1911, being discharged as soon as the emergency was over. On the outbreak of the First World War a force of special constabulary was raised by the Special Constables Act of 1914, and there is now a general power to maintain a body of special police under the Special Constables Act of 1923. At the end of the war the Metropolitan Special Constabulary was made a permanent force as the Special Constabulary Reserve. They are eligible to receive allowances by way of repayment of expenses but otherwise receive no fee, for their service. Generally speaking, the appointment and swearing in of the various ordinary P. constables are vested in either local justices or watch committees; under the Police Act of 1919 the justices appoint the chief constable and the latter appoints the petty or ordinary officers, while the home secretary has the power to make rules for the government of the P. The Metropolitan P. are appointed by the commissioner of P. under the direction of the Home Office, and the City P. are a body appointed and controlled by the common council of the City.

Recent Reforms.—A P. strike in 1918 led to the setting up of the Desborough committee of inquiry. In consequence of its report the Police Act of 1919 was passed. This Act granted increases of pay and standardised terms of service, and estab. the P. Federation. This was fol-

owed by the Police Pensions Act (1921). Between 1928 and 1933 the commissioner, Lord Byng, and his successor, Lord Trenchard, reorganised the Metropolitan P. New duties, such as traffic patrol, were provided for without any addition to the strength. The beat system was reorganised into ordinary beats and patrols in touch by wireless and telephone boxes with Scotland Yard, and motor cars, telephones, teleprinters, wireless, and other mechanical aids, as distinguished from the old fixed point boxes, enabled the P. to respond more quickly to calls. Another important feature of Lord Trenchard's reform was the scheme for recruitment to the higher posts, which materialised in the estab. of a P. college at Hendon for outstanding men from the force or young men direct from the univs. and secondary schools. This training scheme was criticised as undemocratic, and after the Second World War it was decided not to reopen the Metropolitan P. College at Hendon, which had been closed at the outbreak of hostilities. A new P. college was opened at Ryton-on-Dunsmore near Coventry in 1948. It trains only serving constables for senior positions in the force.

Recruiting difficulties after the Second World War presented a serious problem. These were believed to be due to higher rates of pay available in other callings; increase in costs of living; housing difficulties; less favourable prospects of promotion; and to some extent, the physical strain of the P. life. In 1918, the gov. appointed a committee under the chairmanship of Lord Oaksey to consider and report on the question, and their first report was issued early in 1919. This recommended the granting of some increases of pay and salaries together with some alterations in pension rates, measures which were promptly enacted by the gov. but these were accepted, on the whole, coldly by members of the forces as being inadequate to meet needs. The present (1950) scales of pay and pensions for P. came into effect on July 1, 1949. They represent substantial increases on emoluments prior to that date, and conform to the recommendations of the Oaksey committee report (Cmd. 7674) issued in April 1949. The gov. statement (White Paper: Cmd. 7707) accepting the recommendations said that the gov. shared the committee's view that the circumstances of the P. service rendered it essential in the public interest that effect should be given to the recommendations at the earliest possible moment. The pay for men constables starts at £330 a year, rising by ann. increments after the second year to £390 a year after seven years, and to a maximum of £420 a year after twenty-two years' service. The scale for women constables starts at £290 a year, rising to a maximum of £380 a year after twenty-two years. For men sergeants the scale starts at £445 a year, rising to £485 a year; for women sergeants, £400, rising to £440. Inspectors (excepting in London) start at £530, rising by ann. increments of £15 to £575. For Metropolitan inspectors and station

inspectors the scale is £555, rising to £600. Sub-divisional inspectors in the metropolises have the same scale as Class II. superintendents in the provs., i.e. £700, rising by £25 to £750, and chief inspectors in the metropolis a scale equal to the prov. Class I. superintendents, i.e. £800 by £25 to £850. The pay of chief superintendent is £900, rising by £25 to £950. For Metropolitan superintendents, with their greater responsibilities, the pay is £1000, rising by £50 to £1100. Payment of chief constables depends on force estab., ranging from those forces under forty, where pay is £700, by £50 to £850, to those of over 2500, where pay is £2700. The above scales for constable, sergeant, and inspector are exclusive of what the Home Office describes as 'concealed emoluments.' These refer to the value of quarters or tax-free rent allowance, boot allowance, value of uniform, and value of pension (25 per cent of pay). Taking these concealed emoluments into account the following is an assessment of total pay and emoluments for the above three ranks of the P. under the new scales: Constable: minimum of scale of pay, £482 19s.; maximum of scale of pay, £591 2s.; sergeant at maximum scale of pay, £688 14s.; inspector at maximum scale, £805 6s. These are figures for prov. policemen; the London allowance has to be added for the Metropolitan and city of London constables and sergeants.

Auxiliary Services.—The river P., or Thames div. of the Metropolitan force, patrol the Thames from Teddington lock to Dagenham and are the oldest part of the force, having been estab. in 1798 as 'marine police' in the interests of the W. India merchants. They were effective in their early days in ending piracy and pillage. Since then their usefulness has lain in preventing crime and in retrieving drowning persons or dead bodies. They work in liaison with the Port of London Authority and patrol the riv. in motor launches and motor boats. The next oldest branch of the Metropolitan P., the mounted P., originated in 1763 under Sir John Fielding, but in an age of motor cars and motor cycles their value for patrolling the outer areas has necessarily declined though they may still be useful in some conditions of traffic control, i.e. crowds. The dockyard P. were formerly a separate branch of the Metropolitan P., their duties being to prevent and detect larceny of gov. property and military estabs. generally, and to exclude unauthorised persons from prohibited areas. Later, air stations came within their jurisdiction. After the First World War they were replaced by less costly constables recruited by the services dep'ts. The special constabulary attached to the Metropolitan P. represent an even older branch of the service than the riv. or mounted P., for the appointment of temporary special constables to assist the ordinary constabulary dates from the reign of Charles II. The employment of women as police was suggested before the First World War. Women had long been associated with the

P. in such capacities as that of matron to supervise female prisoners, but it was not until 1918 that a small body of women patrols was formed as an integral part of the Metropolitan P. The women P. have had a somewhat chequered existence for in 1922 these patrols were disbanded and only a small nucleus of women P. was retained. Since then, however, more women have been recruited and a woman superintendent appointed.

The Police and Public Carriages: Traffic Control.—From the passing of the Public Carriage Act, in 1869 until 1933 public carriages, their drivers and conductors were licensed by the P. commissioner. In 1933 the London Passenger Transport Board was created to take over the entire control and operation of practically all public carriages. But the P. still have a general responsibility as to the operation of the vehicles so far as that affects general traffic conditions, and the commissioner licenses all drivers and conductors and also all cabs and cab-drivers in the metropolitan traffic area (1800 sq. m. covering London and its environs within a radius of 25 m. from Charing Cross). The commissioner has wide powers to require a certain standard of fitness of cabs before they may be licensed. New designs of cabs and a specimen vehicle must be submitted to Scotland Yard for examination and test. Cab standings or ranks are fixed by the commissioner under powers given by the Hackney Carriage Acts and it is an offence for a driver to ply for hire elsewhere. Property left in cabs is dealt with by the P.; property left in any other public carriage by the operators of the vehicles. One of the most important results of the Road Traffic Act, 1930, was the estab. throughout the country of a system of P. traffic patrols. Their primary or special duty is to supervise traffic, but they have all the other obligations of constables and must attend to any other matter calling for P. action which may be reported to them when on patrol. The patrols do not form a separate estab.; a proportionate number of them is allotted to every div. and for general administrative purposes they form part of the divisional strength. The direction of the P. in traffic matters is assigned to the traffic branch of Scotland Yard under an assistant commissioner. Developments in connection with traffic control include the evolution of a code of standardised signals for P. and motorists and the introduction of automatic signals to regulate traffic at crossings.

Police Duties.—Officially, the following constitute some of the prin. P. duties. A P. constable must prevent breaches of the peace and assaults. This class of misdemeanour, indeed, is that with which he may be said to be mainly concerned. He is justified in arresting persons who commit a breach of the peace in his presence only when the affray is serious and the participants will not desist. To arrest for an assault not committed in his presence is justified only where there are plain signs that an assault has really

occurred; if not, he should content himself with taking names and addresses. Under the Licensing Act, 1921, the P. may arrest any one who appears to be drunk, and incapable of taking care of himself, or any one who is drunk whilst in charge of a child apparently under the age of seven. They may arrest persons in public places or on licensed premises who are drunk and riotous, or drunk while in charge of any carriage, horse, cattle, or steam engine. A P. constable may, under the Vagrancy Acts, 1824, 1838, 1873, and 1898, apprehend any person 'found offending' as a vagrant (*see VAGRANCY*). The comprehensive legal idea of 'vagrancy,' including as it does most of the begging, betting, and soliciting fraternity, together with all loiterers and suspects, gives the P. ample scope for dealing under this heading alone with the great majority of offenders against the received conventions of society. Persons who assault the P. in the execution of their duties are liable to a fine of £20 or six months' imprisonment; and resistance to or obstruction of the P. in the execution of their duties is punishable with a fine of £5 or two months' imprisonment. The P. have the useful power to license pedlars and hawkers. Under the Chimney Sweepers Act, 1875, the chief officer of P. in each dist. is empowered to issue certificates to any person who desires to carry on business as a chimney sweeper. Under the Criminal Law Amendment Act, the P. have important duties to carry out for the protection of women and girls, especially in regard to the execution of search warrants issued by a magistrate where there is ground for believing that a woman or girl is being unlawfully detained for immoral purposes. Under the Prevention of Crimes Acts the P. have wide powers and duties relative to convicts out on ticket-of-leave, publicans harbouring thieves, dealers in old metals, receivers of stolen goods. The P. have manifold duties in the administration of the Public Health Acts, e.g. though they may not interfere with or seize unsound meat, they must at once report any case to the medical officer of health or inspector of nuisances; the P., if authorised by a magistrate, may enter premises where some nuisance from any cause whatever is alleged to exist, for the purpose of investigation. During elections the P. are required to render assistance to the sheriff and other authorities to prevent rioting and to preserve order at the polling stations. Where a fire breaks out on a constable's beat, he should endeavour to send a message to the P. station and fire brigade, his own place being on the spot to protect life and property. There are most minute details as to what constables ought to do at the scene of a murder or any other crime, but it is scarcely necessary to detail them here, for the investigation of crime must obviously be largely a duty the mode of executing which may be left to the discretion and cleverness of the officer concerned.

Arrest and Summons.—A P. constable

may either arrest without a warrant, or by warrant, or merely cause a summons to be served on the offender. He *must* arrest, without waiting to obtain a warrant, any one who commits a felony (q.v. and CRIMINAL LAW) in his presence; he can also arrest without warrant for murder, rape, and other crimes against the person, robbery, arson, burglary, larceny, embezzlement, and other felonious crimes against property; and he can similarly arrest any one who is charged by another with having committed a felony, or whom another, or the P. constable himself, on reasonable grounds, suspects to be guilty of a felony (but the complainant must accompany the P. constable to the station). Vagrants (see above) are liable to arrest without warrant. Where a P. constable cannot by himself effect the arrest he may call upon bystanders to assist him in 'the king's name.' Handcuffing is not essential, and a P. constable must be able to show 'good special reasons' for handcuffing unconvicted persons. A P. constable may question a suspect, but only to the point of satisfying himself that he is justified in arresting. In cases of arrest by warrant, or indeed in any case where the P. constable actually has a person in custody, he has absolutely no right to interrogate him touching the crime for which he is under arrest (see CONFESSIO).

Recent developments in P. organisation are along the line of mechanical ingenuity as an aid to the frustration or prompt arrest of crime (see above). P. questions of internal administration have formed the subject of a Royal Commission under Lord Lee in 1928, with special reference to the limits within which the P. might question prisoners, suspects and others—a matter which involves what is called 'the third degree.' As a result of the commission the limits referred to were considerably narrowed, this action being, obviously, in accordance with the essential spirit of Brit. justice.

Police Courts.—The P. court (and by the name P. court is generally meant the court of a stipendiary) is in theory merely a criminal court of summary jurisdiction, but in practice so wide and heterogeneous is the business transacted in it that it would be truer to say of it that it is the poor man's forum in a number of matters which primarily at least could be dealt with in the co. courts. The P. court jurisdiction and business generally comprises: (1) The investigation of charges of serious crime, like murder, arson, burglary, etc., with the view of either dismissing the accused or committing him for trial at quarter sessions or assizes. (2) The trial of persons charged with (a) indictable offences of a less serious kind, the magistrate having an option of trying the cases himself or sending them for trial by jury at assizes or quarter sessions, and the accused, where the punishment is upwards of three months, having the option of trial by jury instead of a summary trial by the magistrate; (b) non-indictable offences, the bulk of which are charges for assault, drunkenness, begging,

sleeping out, gambling, cruelty to children, malicious damage, and trifling offences against P. regulations or local by-laws. (3) Civil cases of certain kinds, such as summonses for rates and maintenance orders. (4) Applications for summonses or other relief. (See also under METROPOLITAN POLICE COURTS.)

United States.—Organisation of the P. forces varies in the different states. Except in Washington and the Dist. of Columbia, where the P. are under the Federal Gov., the city P. force is under municipal control, but there are many exceptions. In Boston three commissioners appointed by the governor of Massachusetts are at the head of the force. The force of New York City is the most important in the states. Its commissioner is appointed by the mayor; he has four deputy commissioners. All orders are issued through the chief inspector, who is assisted by 18 inspectors, 1 acting inspector, 25 surgeons, 1 superintendent of telegraph, 2 assistant superintendents of telegraph, 1 chief linesman, 5 linesmen, 2 boiler inspectors. After service of 25 years they may retire on half pay, or sooner under certain conditions.

Rank. see RANK, Police.

Statistics.—The strength of the P. force in England and Wales was 65,137 in 1947, and 7300 in Scotland. The Metropolitan P. numbers were 20,598. See S. Stone, *Justice's Manual*, 1914, 1930; Sir C. E. H. Vincent, *Police Code*, 1844, 1931; Snowden's *Magistrates' Assistant and Police Officers' Guide* (11th ed.), 1859; F. W. Maitland, *Justice and Police* (Citizen series), 1885; E. Carpenter, *Prisons, Police, and Punishment*, 1905; H. P. R. Gannon, *The London Police Court*, 1907 (with bibliography); J. F. Archbold, *Metropolitan Police Guide* (4th ed.), 1922; S. and B. Webb, *English Local Government*, 1922; Sir J. F. Moylan, *Scotland Yard and the Metropolitan Police*, 1929, 1934; and C. Reith, *British Police and the Democratic Ideal*, 1943, and *A Short History of the British Police*, 1948.

Police, Military. see MILITARY POLICE.

Polidoro da Caravaggio. see CARAVAGGIO, POLIDORO CALDARA.

Polignac, Melchior, Cardinal de (1661-1741), Fr. diplomat, b. at Puy in Langue-doc, of an illustrious family. He studied at Paris and took holy orders. In 1619 he was employed as a negotiator between France and the court of Rome. In 1693 P. was sent by Louis XIV. as ambas. to Poland, where after the death of John Sobieski in 1696, he endeavoured without success to estab. François Louis de Bourbon, Prince of Conti, as king of Poland. In 1706 he was appointed by Louis XIV. auditor of the rota at Rome. In 1709 he returned to France, and in 1710 he was one of the Fr. plenipotentiaries at the congress of Utrecht. In 1713 he was created cardinal, and from 1724 to 1732 he was Fr. minister at Rome.

Polioomyelitis. see INFANTILE PARALYSIS.

Poliburo. see under RUSSIA, Government.

Politian, or Poliziano, Angelo (1454-94), It. humanist, b. at Montepulciano, in Tuscan; son of Bonedetto Ambrogini, doctor

of law. At the age of ten he began his studies at Florence. Before he was twenty P. had produced Lat. letters and essays in Gk. verse, trans. the first four books of the *Iliad* into Lat. hexameters, and produced an ed. of Catullus. His talent was noticed by Lorenzo de' Medici, in honour of whose brother Giuliano he had written *La Giostra* in 1468. Lorenzo appointed him tutor to his two sons and custodian of his library and collection of antiquities; and P. enjoyed the friendship and patronage of 'Il Magnifico' until the latter's death. As secular prior of St. Paul's in his native city P. was prof. of Gk. and Lat. literature and of philosophy. Towards the end of his life he took orders and was made a canon of Florence. He was much affected by the death of Lorenzo, and himself died when on the point of being created cardinal. P. was the author of *Miscellanea* (1489), dealing with philology and criticism; an ed. of the *Pandects*; Lat. trans. of Herodian's *History*, the *Manual* of Epictetus, the *Aphorisms* of Hippocrates, and numerous other works. But P.'s genius was many-sided, and amid his learned labours he continued to write original Gk. and Lat. verses which have been declared the best modern examples of their kind. See F. O. Mencke, *Historia vite inque litteras meritorum Angelii Politiani*, 1736, and G. de Robertis, *L'Arte di Poliziano*, 1939.

Political Commissars, see under RED ARMY.

Political Economy, see ECONOMICS.

Political Offences. For all practical purposes except extradition, P. O. stand on the same footing in Eng. law as any other crimes; indeed, in the municipal law of most civilised countries the term P. O. is in no sense a term of art, and any Brit. subject who hoped to found his defence on the ground that his offence was committed in order to further some political object would in an Eng. criminal court find that his motives would be ignored and his act judged on its merits purely as a criminal one. Formerly most P. O. in England generally brought the offenders within the pale of the treason statutes. For example, in the case of *Damarce and Purchase* (1710), two men, Daniel Damarce and George Purchase, in the course of the riots arising out of the impeachment of Dr. Sacheverell, set fire to certain meeting-houses, and the court held that such burning, as it afforded sufficient evidence of a design to burn down all meeting-houses, constituted an overt act of levying war and hence treason. In strict theory, the outrages committed by the body of agitators popularly known as militant suffragettes constituted treason, for academically acts of war against the Crown for the attainment by force of a public object come within the Treason Act of 1351. But events proved that any attempt to check the activities of these agitators by the use of this rusty weapon of the legal armoury would have been no less ineffective than the whole machinery of the criminal law.

Where a diplomatic representative of a foreign state makes a requisition to

the home secretary for the surrender of a fugitive offender, the home secretary may, if he be of opinion that the offence is one of a political character, refuse to order the magistrates at Bow Street to issue a warrant for the arrest of the offender, and he may at any time order a fugitive offender, accused or convicted of a political offence, to be discharged from custody. The Extradition Act, 1870, enacts that a fugitive criminal *shall not* be surrendered if the offence in respect of which his surrender is demanded is one of a political character. If the home secretary issues his order against a political offender and the magistrates act on it, the accused can move in the high court for *habeas corpus*.

Political Parties. For the origin and development of party government generally, and in particular of the Eng. party system, see under PARTY and PARTY GOVERNMENT. P. P. exist in every modern country basing its political system on what may best be called the W. European tradition: Fascism and Communism are incompatible with them, and though, in countries which have become Communist since the Second World War, P. P. still exist to some extent, their survival appears to be only a temporary measure, coexistent with a muzzling of their powers of criticism and expression, before they are later dissolved or merged with the gov. party. P. P. may be regarded as the inevitable outcome of government by representation. But the phenomena of P. P. in different countries present some curious points of contrast, and a knowledge of the individual hist. of each is essential to an explanation of their existence and true meaning. Until the twentieth century, and the rise of Socialism, Eng. P. P. were in many ways strongly assimilated, and this situation still prevails in the U.S.A.; but elsewhere, notably on the continent of Europe, P. P. were divided by much deeper lines of cleavage, and the whole meaning of party government was invested with a far greater degree of reality. This is readily to be accounted for by the fact that on the Continent party differences either corresponded to religious or racial differences, or were based upon fundamental differences in political views which could not in the nature of things be fused together. This position remains largely true in Europe, and is now much more applicable to England in the last respect. It is quite true that upon some points parties in England during the nineteenth century were, or seemed to be, for a time irreconcilably opposed to one another; but in practice these differences were enduring mainly on points of detail, and the political hist. of the century shows that in fact the two major P. P. interchanged and absorbed each other's ideas and philosophies to a remarkable extent, e.g. the Tories were, in 1832, fiercely opposed to Grey's Reform Bill, but their literal descendants, the Conservatives, passed a Bill extending the franchise still further in 1867. The close similarity in viewpoint upon fundamentals which existed between the two main Eng. P. P. in the second half

of the nineteenth century resulted in a series of political changes so constant and regular that they became known as the 'swing of the pendulum.' The Irish Nationalists, on the contrary, consistently displayed a hostile front, and for the very reason that their whole political creed was racial and religious. This rapidity of interchange of political power was of course accounted for by the electoral turn-overs, there being always a large percentage of electors who, acknowledging no particular political beliefs, would vote according as certain projected reforms would or would not affect them personally. Since the rise of the Labour party the differences between Eng. P. P. have become much more marked. The div. between Conservatism and Liberalism, on the one hand, and Socialism, on the other, would appear, on certain fundamental issues, to be insuperable, for all Eng. P. P. claim to serve and represent, and do indeed contain representatives of, all classes; but in fact a certain element of class conflict has entered Eng. political life. Nevertheless, 'the swing of the pendulum' remains valid. Though each political party can now rely at each election on a certain constant reserve of support in certain areas, a large proportion of the electorate, known as the 'floating vote,' continues to ignore the fundamental cleavages between the parties, and votes according to how the outgoing gov.'s record, or the projected plans of the different parties, has affected or will affect it personally. The tradition of voting against the administration, as old as the Eng. party system itself, still commands support. But continental electorates, especially those of Germany and France, were, in the nineteenth century, more stable in their adherence to a party. In Germany and Austria the absolutist and bureaucratic system of government which, towards the middle of the nineteenth century, was rapidly approaching decay, reflected itself in an almost total want of progression of liberal ideas and an unquestioning acceptance of the tenets of the different ruling Houses. The rise of the new liberal and national ideas of 1840-47 did not, however, efface from Ger. and Austrian political life the sum of the prin. features of the auct. bureaucratic and military system, and those features survived up to the First World War, though not in their former vigour. The adoption, since the end of the nineteenth century, of the system of proportional representation by many continental countries has resulted in some cases in the emergence of a large number of P. P. often distinctive only in detail. Consequently, the electorate has had a wide choice of candidates, and while a political party, basing its fundamental appeal on a religious faith or a tenet such as Marxism, is always assured of a reservoir of support from its members, support for minor parties has varied considerably from election to election. Often no political party has had a clear majority, and coalitions in France have, since the First World War, been the rule rather than the exception. The policy of such coal-

tions has sometimes differed a great deal, depending upon the dominant party in it, and the consequent instability has affected the electorates, and has caused violent fluctuations in the fortunes, even of the major groups. Party stability thus no longer exists in many cases, though cleavages between the major groups, and much bitterness, remain.

Amer. party lines, though drawn very closely and severely, not only in the nation as a whole, but also in the forty-eight states, and even in most of the cities and towns, are based to a large extent on local and historical associations, and actual differences between the parties are hard to define. The general tendency in the U.S.A. has been to favour the two-party system. There have been, of course, others, and are still, but they do not, as a rule, carry much weight. Since the civil war, as a general rule, the political battles have been fought between the Republican and the Democratic parties (*see further under DEMOCRATS; REPUBLICAN PARTY; PARTY AND PARTY GOVERNMENT; UNITED STATES OF AMERICA, History.*)

In Britain the contending parties strive for control of the House of Commons, because the leader of the majority becomes Prime Minister and forms the Cabinet. In the U.S.A. as a nation the parties strive to elect the President and, secondly, to secure control of both Houses of Congress in order to assure the passage of party measures. In Great Britain, while the life of Parliament is five years, an election may be called at any time upon the advice of the Prime Minister to the king. Elections in the U.S.A. come at regular fixed periods, and nothing can change them unless the law itself is amended. The officials chosen hold office for four years, even if one or both Houses of Congress are overwhelmingly of the opposition party. They can be removed from office only by impeachment, but this has seldom been invoked.

For a discussion of government by a single political party *see under PARTY AND PARTY GOVERNMENT. See further under ELECTORATE; PARTY AND PARTY GOVERNMENT; PARLIAMENT; PROPORTIONAL REPRESENTATION; REPRESENTATION* (includes parl. representation of various parties after the elections of 1933, 1945, and 1950); *UNITED STATES OF AMERICA, History; GERMANY, History; FRANCE, History, etc.*

Politics, science which is concerned with the citizen in his relations to the state. It therefore embraces a study of the foundation and general constitution of that highly complex structure, the state, the different politics of different nations, the administration of gov., and the principles and method of legislation. As a science, it is the general view that Aristotle was its classic founder, and his fundamental classification of forms of gov. into royalty, aristocracy, and commonwealth, with their respective parallels, tyranny, oligarchy, and democracy, though criticised, is still a useful basis. The value of Aristotle's *Politics* lies in that he fixed the general terminology and classification of

forms of gov. (see GOVERNMENT), and considered the sev. possible types of gov., the institution of a model state, and the meaning of 'citizen.' With Aristotle a constitution conceived in the exclusive interest of a class, even though it be of the majority, is wrongful and perverse (Pollock), an opinion the force of which must be admitted in considering the problem of the representation of minorities (see REPRESENTATION). Again, he lays down that a normal or right constitution is one that is framed and administered for the common good of all, whether the sovereign power be vested in one, with a few, or with the many—a position adopted in every allied science by every utilitarian philosopher of more modern times. Permanent as much of his work may seem to be, it cannot be denied that the limitations of social progress in Aristotle's time are reflected in his analysis of governmental forms. Many of his definitions and classifications are sterile, and sound dangerously like mere truisms, offering little from which a modern progressive statesman can learn. He conceived of the small city state as the norm of political life, in which the people could enjoy direct participation in gov.; the problems of the modern nation-state can thus in many cases find no answer in his theories. He knew, and could know, nothing of the indirect form of legislation and executive power which is conferred by the right of sending representatives to form a legislative assembly out of which all the members of a modern cabinet are chosen (see CABINET), nor could he know anything of party gov. (q.v.). Again, his analysis is too circumscribed in at least three directions. First, he has nothing useful to say about international relations and, inferentially, the force of treaty obligations (see also COMMERCIAL TREATIES); secondly, his deductions from the true type of the city state leave no room for the science of governing colonies and dependencies; and, thirdly, he altogether underrated the importance of the allied science of political economy. Aristotle, however comprehensive his survey of sciences, did not, in the spirit of Novalis, appreciate the essential oneness of all sciences; he considered political economy as a study of society apart from any constitution or particular form of gov., as something indeed which was 'merely auxiliary to the general welfare of the state and the promotion of the most desirable type of life' (Pollock). So lasting was the teaching of the Gk. philosopher that the mental attitude which could regard the pursuit of wealth as not necessarily interwoven with P. subsisted till the most recent times, and there is hardly a great writer on political economy of the last century who does not work out his science as a separate study related in merely the most perfunctory manner with the problems of gov. It may well be conceded that from the point of view of mere convenience it is alien to the study of the forms of gov. or the conception of a state to enter upon questions of economy, but the recognition of a convenient

demarcation of one science from another for purposes of clear exposition ought not to result in forgetfulness of their essential interdependence.

Modern political scientists have greatly extended the conception of the democratic form of gov., and of the functions of any kind of gov. The coercive action of trades unions bringing about the amelioration of the social condition of the working classes, and the recognition by the legislature of their claim to act without undue interference on the part of the state; the whole of modern factory legislation, laws of public health, and statutory regulation of industrial and provident organisations, find in classic times nothing to indicate an analogous conception of state duties beyond the vaguest generalities about the 'common good of all' and a 'complete life in the associated state.' No doubt these generous expressions are ample enough to connote almost anything, but both Aristotle and a host of later philosophers regarded gov. as the privilege of the cultured and leisured, and the state itself as a limited and privileged class, sentiments which are by no means dead. Plato, whose *Republic* Bertrand Russell has described as a 'totalitarian tract', was, no less than Aristotle, in the highest degree of an aristocratic cast of mind, and his notion of an ideal state is a pure *a priori* deduction from the perfectly wise ruler ('philosopher king') as Plato imagined such a being. Full citizenship was the monopoly of an upper caste, trained for the purpose, and segregated from the masses.

From the time of the merging of the political genius of the Gks. into the Caesarism of the Rom. Empire until the Renaissance there was no room for speculation in P. The Romans had without doubt a peculiar genius for practical gov., but not only was the very omnipotence of the Caesars hostile to all independent political life, but the various peoples over whom Caracalla had thrown the yoke of Rom. citizenship themselves seem, during the decline of Rome, to have manifested a political apathy not unnatural in an age that recognised without question the inevitable ascendancy of the Romans over the known confines of the civilised world. When the empire of the Caesars gave place to the Holy Rom. Empire and the great feudal kingdoms of W. Europe, the all-dominant question of the times, far from having any bearing on theories of the state or constitutional limitations on political sovereignty, was the controversy between the temporal power and the spiritual autocracy of the papal see. No medieval writer thought of disputing that unlimited monarchy was the sole guarantee of peace or any measure of freedom, and even the works of Dante (*De Monarchia*) and Aquinas (*Summa Theologica*) are concerned merely with scholastic arguments in favour respectively of the divinely appointed and universal rule of the emperor and the pope. The real revival of the science of P. in a form in any way adapted to the civilisation of modern Europe comes only with Hobbes',

Leviathan (1651), though the details of statecraft were first worked out by Machiavelli in the *Prince* (1532). Machiavelli's works, though in themselves hardly a contribution to the theories or analysis of the state, are significant for their revival of the long-forgotten separation of ethics and P., a separation (made first by Aristotle) which may be said to be intimately bound up with his unique if somewhat maligned reputation. In his view no It. state of the sixteenth century could hope for sovereign independence if morality were allowed to obstruct the free play of the principles and motives of human self-interest upon the art of P.; in a word, he appears to postulate absolutism as the only form of gov., and is concerned only with the means of conserving that acquired sovereignty. Hobbes, believing that security was the greatest wish of human beings, twisted the doctrine of the 'social contract' to reach the conclusion that absolute monarchy must be preferred to its sole alternative, anarchy. In many points he was anticipated by Jean Bodin in his *Six Livres de la République* (1576). The cardinal point of departure in the work of these two publicists is the recognition of the essential attributes of political sovereignty, whether inherent in one or the many, in particular the recognition of the superiority of the political sovereign over the laws as a necessary condition of the very conception of a sovereign. There is, however, in the political theories of both Bodin and Hobbes a curious but highly instructive inconsistency. Both incline strongly in favour of despotic power, or sovereignty unrestricted by any legal limitations; yet both, especially Bodin, set such moral limits to this absolutism as upon the face of them have a force no less real than that of law. The significance of this detraction (however unconscious) from genuine absolutism lies in the fact that it contains the very germ of modern constitutional sovereignty, and marks an important advance on such ant. and medieval notions of personal and feudal kingship as were consistent only with the view that society was based upon *status* and not *contract*.

The analytical jurist Austin, more clearly than any other writer, and with a vast tediousness of formal logic, insists upon hard and fast distinctions between sovereignty, morality, and positive law, and so carries the work of Hobbes to its legitimate conclusion; but though even in the present state of the science of P. there is an element of truth in these distinctions, the speculations of Hobbes and Austin on sovereignty were very far removed from the later conception of the co-existence in every independent state of both a legal and 'political' sovereignty (see GOVERNMENT). In a word, though it is impossible to deny that that sovereignty is a contradiction which is expressed to be limited by *morality* or *policy*, yet there is no paradox in saying that in England Parliament, or the elected representatives of the people, is legally omnipotent, but morally subordinate to the will of the

electorate. Hobbes saw clearly enough that sovereignty could not be divided, and held that the rights and powers of the sovereign (viz. the powers of legislature and judicature, of making war and peace, of choosing counsellors, of punishing, and of regulating titles) are indivisible and incommunicable, and that though they may be delegated, cannot be abandoned. Pollock considers that whatever source of error there may be in Hobbes's theory of sovereignty lies in the fact that it did not occur to him that sovereignty might be vested in a compound as well as in a simple body. Even Austin, with all his narrow formalism, saw this, though his sovereign body of king, lords, and commons is no more than the 'legal sovereign' of Dicey.

The latter part of the seventeenth and the eighteenth century saw a considerable advance in the science of P. The great names (leaving Bentham for later consideration) associated with this period of its development are those of Locke and Burke in England, and Rousseau and Montesquieu in France. All four, each in very different manner, dealt with the theory of the social contract, and to Burke belongs the credit of having finally disposed of it, though not before Rousseau had brought down the storm of the Fr. revolution upon his country by its almost direct instrumentality. There is a curious point of contrast between the work of Locke at the end of the seventeenth century and that of Rousseau a century later. Locke, in his *Essay on Civil Government* (1690), defines a political society as one in which every member has quitted his natural powers of preserving his property and punishing others, and 'resigned it up into the hands of the community in all cases that exclude him not from appealing for protection to the law established by it.' He refutes the claims of absolute monarchy on the ground that an absolute monarch, being no 'common judge with authority' to decide between himself and his subjects, is therefore in a state of nature with regard to them. The *Essay* was intended to justify the revolution of 1688 and the estab. thereby of a truly limited or constitutional monarchy in place of the Stuart dynasty claiming to rule *jure divino*. Rousseau, on the other hand, contemptuous of the shifts and evasions of Locke, boldly using the fiction of the social contract as a convenient metaphor for the expression of democratic truths, constructed in his brilliant *Contrat social* (1762) a theory of gov. and civic rights which appealed so powerfully to the imagination that many of its propositions found their way into the *Declaration of the Rights of Man*; they have equally been claimed for the Hegelian school. Locke, founding to a certain extent on Hooker's *Ecclesiastical Polity* (ed. Keble 1836), postulates as the distinguishing mark of society in a state of nature the want of a common judge with authority; but he disagrees with Hobbes's theory that men in a state of nature are no better than 'brute beasts,' and that the hand of all is

raised against all in war, by asserting that even prior to the beginnings of actual political society men in the aggregate are at least ruled in their actions by reason. He endeavours to establish, at least in outline, all the cardinal private rights of civilised mankind as resting upon their own inherent basis of reason before he comes to the point of sealing them with the guarantee of a true political society. Pursuing this purely arbitrary and *a priori* method, Locke, having estab. his commonwealth through the social contract and the election of a 'common judge with authority,' goes on to justify the right of the majority to be the ultimate source of political power upon the apparently safe ground of practical necessity. Exactly in what body Locke vests the sovereignty is difficult to say, for not even the philosophers of his age seem fully prepared to deny that the king was politically the head of the state. But with the object lesson of the Bill of Rights before him, Locke was safe in saying that the legislature was vested with the supreme power, though he immediately qualifies this by assuming such investiture to be in the nature of a trust. This is merely another way of saying that all government is founded on consent, though, in an age of a corrupt and practically non-existent franchise, it was necessary for Locke somehow to distinguish, so far as England was in his mind, between a dissolution of gov. and a disruption of the political society by war. In short, Locke's purpose was to demonstrate that a moderate constitutional gov. was the only gov. justified by the law of nature, the actual form of government being immaterial, though throughout his works it is patent that his hypothetical case is, and could only be, the Eng. constitution. But he was far more concerned to outline a practical concept of government than to produce a complete and tidy theory. Locke limits the powers of the supreme legislature by prohibiting the taxation of property without the consent of the people given by themselves or their deputies, the dispensation of justice otherwise than by estab. law and authorised judges, and the transference by the legislature of its powers to any other person or body.

With Rousseau political science, in its *a priori* and analytical stage, reached the limits of its possibilities. The theory of the social contract, as metamorphosed in the crucible of Rousseau's intellectual wizardry, took the form of a surrender by each and all of their natural rights, not to any sovereign, but to the whole society under the sovereign direction of 'the general will.' Since, therefore, each individual receives in exchange, as it were, an inseparable part (however infinitesimal) of the whole communal sovereign power, he is, in the last resort, as free as he was prior to entering into the *contrat social*. The resulting paradox is that there is no sovereign in Rousseau's state in the sense in which Hobbes, Locke, and other writers use that term, the community itself being at once a corporate

sovereign entity and an aggregate of unrelated subjects, governed not directly but only mediately by whatsoever form of gov. may happen to exist in the particular community. Rousseau's theories have but little to say on *legality*, for the simple reason that with him the laws imposed by the general will cannot be unjust, and to be the true expression of the general will must themselves be characterised by generality. The most obvious and far-reaching deductions from Rousseau's theories are: (1) that all men are equal; (2) that no monarch has any title to sovereignty; (3) that all existing govts. inevitably strive to monopolise sovereign power; (4) that political society is generally overwhelmed by its rulers and so perishes (a palpable invitation to the Fr. people to save themselves); and (5) the futility of Eng. representative gov. as an alternative to the ideal Gk. city-state, because it is utterly inadequate to express the general will. The greatest difficulty lies in the trans. of the general will into actual government. Rousseau himself provides no satisfactory solution, and perhaps the only answer is to equate 'general will' with the common sense of the whole community acting as the final court of appeal.

Against Rousseau's somewhat nebulous theories stands the *Esprit des lois* (1748) of Montesquieu, 'who,' says Pollock, 'with all his faults and irregularities, is the father of modern historical research.' Too much stress cannot be laid upon the importance of this statement; for although his own contemporaries did not fully appreciate the greatness of Montesquieu's work, its significance in the science of P., and indeed in all philosophy, lies in the fact that it heralded the dawn of the historical as opposed to the analytical method. No doubt Montesquieu's information was 'often crude and imperfect, his inferences often hasty, and his judgment often misdirected,' but they were a sure beacon to posterity in that they substituted the method of induction from actual facts for the *a priori* sophistries of mere dogma or guesswork. Besides this method of political science, Montesquieu's contributions to P. included a comparative theory of legislation and institutions suited to the political needs of different forms of government and a comparative theory of P. and law based on a comprehensive observation of the actual systems of different countries and epochs. Bentham carried the former of these ideas into execution (see under BENTHAM, JEREMY), while Maine, Labnitz, Savigny, Seeley, Dhuntchali, and Spencer evolved, though in markedly different ways, the latter idea. Burke's *Reflections on the French Revolution* (1790), which, together with his other works, is the true precursor of the historical method, may be excluded from detailed consideration, because it is almost purely destructive and contains next to no political theory at all, and what there is is marred by inconsistency; for at one time he champions legality, at another pits his eloquence against formalism of all kinds. His

importance in the development of the science of P. lies in his recognition of the fact that civil society is not a machine but a social organism and a social discipline, and that therefore the guiding light of any politician should be nothing but such rules of equality and utility as are favourable to the preservation of all existing rights and liberties.

Bentham's *Fragment on Government* (1776), though contemporaneous with Rousseau and Burke, is better left for separate consideration, because the man and his work generally are unique and apart. If a dichotomy into analytical and historical schools of thought be necessary, he belongs rather to the former; but at the same time his breadth of mind enabled him to put something like life into the dry bones of a *priori* dogma. This is not the place to discuss all his ideas (which are summarised in the article BENTHAM, JEREMY) but it is appropriate to notice here his view of sovereignty and his theory of the final cause or purpose of any sovereign. Bentham, eschewing formality of definition, regards the salient feature of a political society as the *habit of obedience* manifested by a number of persons towards other persons 'whom we may call governor or governors. The power of the sovereign he treats as unlimited, though there is all the difference possible between the legal duty of obedience to the supreme legislature and the political doctrine of non-resistance. Even later writers on sovereignty, like Dicey, recognise the fallacy of a limited supremacy, though to Dicey belongs the credit of making anything like an adequate distinction between legal and political sovereignty. But it is due to Bentham to realise that his was an age when it was still necessary seriously to consider the nature and authority of the state *qua* state and to assert the sanction of positive law. Much of Bentham's work is now merely of historical interest, but that a great number of his deductions were far in advance of his time is demonstrated by the fact that reform has almost down to the present day been consistently along the lines of his suggestions.

The science of P. as it stands to-day, has gone far beyond the stage of theorising about sovereignty and the state, the distinctions between P. and ethics, positive law and morality, and taking these things as axiomatic concentrates upon the science of legislation, or, in other words, the discussion of what matters are fit to be controlled by the state and what left to individual discretion. The science of P. as viewed from this standpoint relates, therefore, to what older theorists would have regarded as mere political expedients; but then societies had not become accustomed to law-making and much was left to the undisputed sway of custom or local laws. Yet the objects of legislation are all-important at the present day, and theories of the state and of sovereignty, if they require detailed discussion, may do so in view of three developments: (1) the interrelations of states bound together in a federal union, (2) the promulgation of written or rigid

constitutions, and (3) international law (*q.v.*). According to Dicey, the legal sovereign power in states having a written constitution (as have all federal states) is strictly a dormant power called into play only when changes in the letter of the constitution are contemplated. In a manner of speaking the wealth of discussion at the present day on the appropriate sphere of legislative activity, or the limits of state intervention, whether directly or through the medium of bodies with delegated sovereign powers, was rendered possible by what may be fitly regarded as Bentham's most important contribution to P., *viz.* the obligation of the sovereign to make laws. Prior to the nineteenth century comparatively few Acts will be found in the Statute Book, the duty of the state not being considered to extend far beyond the irreducible minimum of preserving order within the ter. and repelling external aggression.

The work of Bentham's contemporary, John Austin, is important in further differentiating the various allied topics of political speculation by his masterly if laborious separation of the theory of political sovereignty from that of the ethical and historical foundations of political society, with the object apparently of merely arriving at a pure science of positive law, an object which has since been far more concisely and readably done in Sir Thomas Erskine Holland's and John Salmond's works on *Jurisprudence* (see JURISPRUDENCE).

The prin. Eng. exponents of the historical method, as opposed to the analytical or deductive are Sir H. Maine (*Ancient Law, History of Early Institutions, and Village Communities*) and Herbert Spencer. But this method has attained its perfection rather in Germany at the hands of Savigny, Ahrens, and others, who, however, arrive as Pollock points out, at very much the same results as to the meaning, nature, and functions of political institutions as the school which is commonly opposed to them. A more important school of continental publicists is the ethical, who, 'throw their main strength on investigating the universal moral and social conditions of gov. and laws, or at any rate civilised gov. and laws, and expounding what such gov. and laws are or ought to be, so far as determined by conformity to those conditions.' The weight attached by continental writers to this method is explained by the fact that their legal and political institutions are permeated by the study of *Naturrecht*, a legacy of the traditions of the Rom. empire, or rather the Stoic philosophy, through the Rom. *Digest* and the writings of Cicero (see JURISPRUDENCE). It is probable, however, that to whatever extent the Ger. publicists may have attempted to apply transcendental ideas to the treatment of P., their results are not in the main very far removed from those of the Eng. empirical schools of thought.

To-day political theorists bring philosophy to bear more closely upon the science

of P. Duguit in France and Laski in England contend that a system of direct representation of economic and professional interests should take the place of representation based upon ter. and pop. Modern life being a condition of economic warfare, it is held that occupational group representation will solve many of the problems left untouched by the present system. Syndicalism goes beyond this in condemning all political action as hitherto understood, on the ground that the state, being built upon force and obedience, cannot achieve for the individual a minimum of restraint; and in making the claim that the trade union group is the foundation of society, and should therefore control society. Thus there would be no state as we know it and the evils of majority rule would, in the syndicalist view, disappear. On the other hand, public opinion is as important an element in the foundation of the 'state' as is force, and few would be found to agree that the trade union group is the foundation of society. G. D. H. Cole, who does not go so far as the syndicalists, contends that the state 'should own the means of production, the guild should control the work of production.' His guild state may be described as a federation of groups. Bernard Shaw says 'democracy is merely the substitution of the incompetent many for the corrupt few,' and meets the currents of idealism that inform political philosophy to-day with the criticism 'there is no sincere public opinion to-day that a man should work for his bread if he can get it for nothing.' In America, Lippmann observes that the new ideal can be found in mastery, founded on an increasing knowledge of man over nature and over himself. Writers of the Hegelian or idealist school maintain that the state has a will apart from the will of its individual members and that the purification of the state will must be the goal of every endeavour. This has been stated by Bonquet, and, with some hesitations, by T. H. Green. Fascism puts into practice this theory of the final supremacy of the organic state.

The U.S.A. presents unique political problems of a special interest. For the U.S.A., as also Canada and Australia, illustrate the principle of federalism, probably the only political system which has more or less successfully solved the great problems in the transference of people of an old civilisation to virgin soil. These people of every stage in civilisation and education have been promptly admitted to citizenship and have settled peaceably in their new country. Peculiar problems are a natural consequence, such as the kind of nationality which is ultimately to emerge as really 'American,' and the balance between E. W. and the Middle W. (q.v.).

There is always a time-lag between new political ideas and the conditions which favour their application in practical P. and, as has been well said by Zimmern, ideas in all ages have been forces and most of all when the so-called practical men

who were impregnated by them were not conscious of their motive power. Among the ideas and doctrines which are active to-day or which play or have played a large part in the formulation of contemporary international policies may be mentioned those especially of Karl Marx and Friedrich Engels, which supplied the driving power to Lenin's political experimentation. Yet behind Marx lies the Dialectic of Hegel, though the latter's undoubted influence on Brit. Idealism would have been slight had not Marx been his disciple. Together Hegel and Marx achieved a real revolution in the orbit of political ideas, a revolution which involved the reinterpretation of the axioms of the rationalistic philosophy of Liberalism as a new attitude to the historical process and to man's place in that process, a reinterpretation founded on Hegel's 'historical relativism.' Marx reconciled Hegel's concept of the historical process with his belief in man's freedom to remould his own world by his theory of Dialectical Materialism. Freedom, declares Marx, is only possible when the historical dialectic is regarded as the conflict of social and economic forces, directed not by any world-spirit, but according to laws ascertainable by social science. Engels, like Marx, was insistent both that political democracy must be abolished and that independent states must disappear, so as to pave the way for a world revolution which would subvert capitalism in all countries and convert the world into a union of socialist republics. The influence of this philosophy on Soviet Russia is too obvious for further comment.

Modern European political authoritarian thought has many of its roots in Hegel's *Grundlinien zur Philosophie des Rechts* (The Fundamental Lines of the Philosophy of Right), particularly in his conceptions of the rational character of the state, of freedom as service to the state, and of hist. as the revelation of the reality of the spirit. Nietzsche's influence on political thinking is seen chiefly through his idea of the superman and the pseudo-messianic manner in which he conveyed this conception. But the slogans or catchwords (what Georges Sorel called 'myths'), as well as philosophical doctrines, have not seldom in modern times exerted a profound influence in P. The theory of the myth was first expounded in Sorel's *Reflections on Violence* and developed into a philosophy by Pareto. Hitler and Mussolini showed that, in an age of slogans and propaganda, men of action can, for their own ends, distort ideas that have long been current in more or less academic discussion. Thus Hitler's nationalist slogans owed something to the impetus given by Herder to national consciousness and to Fichte's arrogant *Addresses to the German Nation*; while Mussolini's Fascist utterances were related to the philosophy of Hegel and to Mazzini's nation-state theories, and also to the doctrines of Sorel. Hitler's racial theories, if they may be so styled, were mere political window-dressing directly traceable to the

confused ethnical theories of Gobineau, Houston Stewart Chamberlain, and others. The principle of self-determination, as conceived by Woodrow Wilson, is merely a statement of the nation-state doctrine, but with a clearer perception of the connotation of 'nation,' 'race,' and 'people,' and of their interrelationship. See also COMMUNISM; IDEOLOGY. See H. Sidgwick, *Elements of Politics*, 1850; H. Spencer, *Social Statics*, 1851, and *Sociology*, 1877-96; Sir G. C. Lewis, *Methods of Observation and Reasoning in Politics*, 1852; J. K. Bluntschli, *Theory of the State*, 1868; Sir F. Pollock, *History of the Science of Politics*, 1890; W. Lippmann, *A Preface to Politics*, 1913; H. J. Levy, *Economic Liberalism*, 1914; H. J. Laski, *Problems of Sovereignty*, 1917, *Grammar of Politics*, 1925, 4th ed. 1948, and *The State in Theory and Practice*, 1935; L. Hobhouse, *Metaphysical Theory of the State*, 1918; A. E. Zimmern, *Nationality and Government*, 1918; F. Jenks, *The State and the Nation*, 1919; Viscount Bryce, *Modern Democracies*, 1921; C. E. Merriam, *American Party System*, 1922; B. and S. Webb, *Decay of Capitalist Civilisation*, 1923; H. E. Barnes, *Social and Political Theory*, 1924; F. W. Coker, *Recent and Contemporary Political Theory*, 1925; B. Bosanquet, *The Philosophical Theory of the State* (reprinted), 1930; H. Finer, *The Theory and Practice of Modern Government*, 1932; C. Brinton, *English Political Thought in the 19th Century*, 1933; Phyllis Doyle, *A History of Political Thought*, 1933, 1949; B. Russell, *Freedom and Organisation*, 1914-1914, 1934; A. V. Dicey, *Law of the Constitution* (9th ed.), 1939; R. H. Crossman, *Government and the Governed*, 1939; J. P. Mayer, *Political Thought*, 1939; E. Jenks, *The Ship of State*, 1939; T. D. Weldon, *States and Morals*, 1946; J. Bowle, *Western Political Thought*, 1947; C. F. Strong, *Modern Political Constitutions*, 1949. See bibliography of LIBERALISM.

Poliziano, see POLITIAN, ANGELO.
Polizzi Generosa, tn. of Palermo, Sicily, 23 m. N.W. of Caltanissetta. Pop. 8000.

Polk, James Knox (1795-1849), eleventh president of the U.S.A., b. in Mecklenburg co., N. Carolina, and educated at N. Carolina Univ. In 1820, P. was admitted to the Bar. From law he turned into politics. The first public capacity in which he served was the chief clerkship of the Tennessee House of Representatives. He was nominated by the Democrats of Tennessee as governor of the state and was elected. From 1835 to 1839 he was Speaker of the U.S. House of Representatives. In 1844, he was nominated by the Democrats for the presidency. The convention advocated the annexation of Texas, and the immediate occupation of Oregon. The Whigs nominated the famous Henry Clay. P. was elected. Before he was inaugurated, Texas had already been annexed to the U.S.A. P., as president, said the country must settle the Oregon boundary and acquire California. Oregon, as then thought of, was a remote unsettled region between 42° and 54° 40' N. lat., and extended from the

Rockies to the Pacific. Both England and the U.S.A. claimed it on account of discoveries and explorations of their nationals. Had England yielded, Canada would have had no Pacific coast. England proposed that 49° be the boundary line, and this was accepted. The Californian question was settled by the war with Mexico. As a result of the Oregon settlement, and of the annexation of Texas and California, the U.S.A. acquired about 1,200,000 sq. m. and completed its continental expanse.

Polka, lively round dance of Bohemian origin, danced to music written in two-four time. It was invented about 1830.

Poll, see ELECTIONS.

Pollack (*Pollachius virens*), fish closely related to the cod-fish; belongs to the cod-fish family, Gadidae. It has no barbel depending from its chin, and its lower jaw projects beyond the upper. Like others of its genus, it is carnivorous.

Pollaiuolo, Antonio (1429-98), Florentine painter and metal worker. He studied under the goldsmith Bartoluccio, stepfather of Ghiberti, and later assisted the latter in modelling the gates for the Baptistery of Florence, completed in 1452. He also worked as a goldsmith and as a sculptor in bronze, and the monuments to Popes Sixtus IV. and Innocent VIII., in St. Peter's at Rome, are his work. His pictures are lively and vigorous. With him worked his brother Pietro (1443-96).

Pollaiuolo, Simone del (1454-1509) Florentine architect. He studied in Rome, and on returning to Florence was employed by Strozzi to complete the palace begun for him by Benedetto Maiano in 1459. He also designed the council hall of the Signoria and the sacristy of San spirito.

Pollan, see COREGONUS.

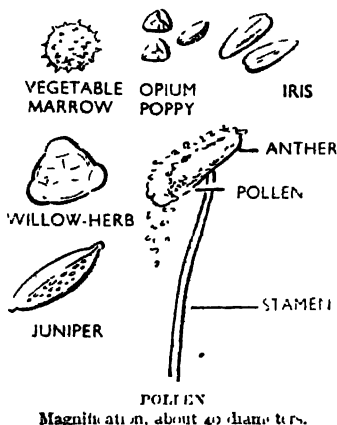
Pollard, Albert Frederick (1869-1949), Eng. historian, b. at Hyde. Educated at Portsmouth Grammar School, Fettes School, and at Jesus College, Oxford. He was assistant editor, *Dictionary of National Biography*, from 1893 until 1901, and was prof. of Eng. hist., univ. of London, from 1903 to 1927. Later he was director at the Institute of Historical Research. Besides 500 articles in *Dictionary of National Biography* and considerable portions of *Cambridge Modern History* and *Political History of England*, P.'s works include *The Jesuits in Poland* (1892); *Henry VIII.* (1902); *Reign of Henry VII.* (1913-14); *Short History of the Great War* (1920); *Factors in American History* (1925); and *Wolsey* (1929).

Pollard, Alfred William (1859-1944), Eng. bibliographer, b. in London, and educated at King's College School and St. John's College, Oxford. He worked for nearly forty-two years in the dept. of printed books, Brit. Museum, for the last five as keeper. He succeeded Burnhull as director of the Early Eng. Text Society, and ed. Herrick in the Muses' Library. Produced *English Miracle Plays* for the Clarendon Press, and ed. Chaucer. He became secretary of the Bibliographical Society which, in 1926, produced the

Short Title Catalogue of books printed in Eng. (1475-1640) and, in 1939, *Greg's Bibliography of the English Printed Drama to the Restoration*. P. planned and directed the *Catalogue of Books printed in the 17th Century now in the British Museum*, 1908-16. In 1909 appeared the famous *Shakespeare Folios and Quartos* with its support of the integrity of the ordinary early printers and publishers. After this appeared his *Records of the English Bible* and, in 1910, he pub., in collaboration with H. C. Bartlett, *A Census of Shakespeare's Plays in Quarto* (1594-1709).

Pollarding, the practice of lopping off the top or head of trees to the main stem to cause it to form a number of young branches. Willows and poplars are the only trees commonly so treated.

Pollen, male fertilising cell of flowering plants, formed in the P. sacs of the anther. It is a rounded or polygonal cell, and contains a dense granular protoplasm, and



its outer surface is often covered with oil; its colour is generally yellow, but sometimes blue or red; when it reaches the stigma it germinates, and the P. tube penetrates to the ovary, which it fertilises.

Pollen Analysis, in archaeology, see under PREHISTORY.

Pollensa, tn. of Majorca, Balearic Isles, 28 m. N.E. of Palma, with a trade in wine. Pop. 8500.

Pollenzo, tn. of Italy, 4 m. N. of Macerata. There are numerous Rom. remains. Pop. 6000.

Pollination, transfer of pollen from one flower to another by the agency of insects or by the wind. The P. of plants of different species is hybridisation.

Pollack, Sir Frederick (1845-1937), Eng. 1st baronet, grandson of Lord Chief Baron P., 1st baronet, b. in London; educated at Eton and Trinity College, Cambridge, where he was Pitt scholar in 1865 and first chancellor's medallist in 1867. He became a fellow of Trinity in 1868; and

was called to the Bar in 1871. P. was prof. of jurisprudence, Univ. College, London, 1882-83; Corpus prof. of jurisprudence, Oxford, 1883-1903; prof. of common law at Inns of Court, 1884-89. He was made P.C. in 1911; and in 1914 he was appointed judge of Admiralty Court of Cinque Ports, and became K.C. in 1920. Among his many publs., sev. of which are standard works, were textbooks on common law, torts, ship, land laws, and, in collaboration with Sir R. Wright, *Possession in the Common Law* (1888). In collaboration with F. W. Maitland he wrote a *History of English Law* (1895). His *Principles of Contract* went into its tenth ed. in 1936. He also wrote *Spinosa: his Life and Philosophy* (1880), *Leading Cases done into English* (2nd ed., 1876); *An Introduction to the History of the Science of Politics* (1890); and *Outside the Law* (prose and verse, 1927). *The Etchingham Letters* 1899 is an entertaining jeu d'esprit written in collaboration with Ella Fuller Maitland. He was ed. of the Law Quarterly Review from 1885 to 1919, and ed.-in-chief of the 'Law Reports' from 1895 to 1936. P. ed. the Lincoln's Inn MS. of Selden's *Table Talk*, 1927.

Pollak, Robert (1799-1827), Scottish poet, b. in Renfrewshire; educated at Glasgow Univ., and became a minister in the United Secession Church. He wrote *The Course of Time* (1827), a didactic poem in ten books, after the manner of Cowper and Young. It is very uneven, but had a great contemporary reputation. His *Tales of the Covenanters*, a work in prose, was pub. in 1833 (A. Thomson's ed. 1895, 1928). See life by D. Pollak, 1843.

Pollakshaws, dist. of Glasgow, Scotland, on White Cart Water, incorporated into Glasgow in 1912, with textile industries, particularly cotton.

Pollakshields, S.W. suburb of Glasgow, Scotland, incorporated in the city in 1891.

Pollonarius, see POLONNARUWA.

Poll Tax, or **Capitation Tax**, tax levied on the individual. It was employed in ant. Athens, and sev. famous levies have been made in England. The first was in 1377, and the poll-tax levied in 1380 led to Wat Tyler's rebellion. It was a favourite means of raising money under the Stuarts. Many Amer. states have employed a poll-tax to prevent Negroes and 'poor whites' from voting.

Pollution, see NUISANCE; PUBLIC HEALTH, *Pollution of Water*; WATER SUPPLY.

Pollux, see GEMINI.

Polo, Marco (1254-1324), Venetian traveller. He was b. of a noble family, and at the time of his birth his father and uncle were absent on a commercial expedition to China, where they were asked to return by Kublai Khan. This they did in 1271, taking Marco with them. They travelled by way of Mesub, Bagdad, Khorassan, the Pamir, Kashgar, Yarkand, Khotan, Lob Nor, the Gobi Desert, Tangut, and Shangtu, and reached the Khan's court in 1275. The Khan sent Marco as an envoy to Yunnan, Burma,

Korakorum, Cochín China, and India, and for three years he acted as governor of Yangchow. The Ps. finally left China in the train of a Mongol princess, and returned by way of Sumatra, India, and Persia to Venice, which they reached in 1295. In 1298 Marco received the command of a vessel in the fleet fitted out against Genoa, and was made prisoner after the Venetian defeat at Curzola. While in captivity he dictated an account of his travels to Rusticiano of Pisa. This work, which suffers from the monotony of its style, has been trans. into many



languages; Eng. eds. are those of J. Marsden (1818), T. Wright (1831), H. Murray (1844), Sir H. Yule (1871, revised and augmented by H. Cordier, 1903), and in Everyman's Library, ed. by J. Marsden. See life by G. Danilelli, 1911; also G. K. Hudson, *Marco Polo and the Discovery of China*, 1949.

Polo, ball game played on horseback, is one of the oldest, if not the most ancient of games. It is impossible to trace its commencement, but it was played in Persia certainly before 500 B.C. Persia may be regarded as the home of P., most interesting records of its early hist. being contained in many illuminated Persian MSS. in the Brit. Museum. The game was early known in Byzantium, afterwards finding its way into Japan and China, and thence to Tibet and India. The first recorded description of an international P. match is given in Firdusi's *Shāhnāma* (eleventh century), the game being between Persian and Turkish teams. The beginning of the modern game of P. in England dates from the nineteenth century. The game quickly became popular, especially in the army, clubs being formed in London, Rugby, and Dublin. A P. ground is usually 300 yds. by 160 yds.; it must not be less than 275 yds. in length. The ideal goal posts are made of basket work, as these may be repaired easily, though it is very usual to have them made of Willow paper, so that they may break easily if collided with. The height of the goal posts is 10 ft. The stick consists of a cane handle about 52 in. in length, set into a head

which takes various forms according to the particular fancy of the owner. The ball, usually made from the willow-tree root, is 3½ in. in diameter and 5½ ounces in weight, though sometimes balls made of 'Exhote' are used. There are four players on each side. P. ponies are bred and trained for the game, and are now almost always thoroughbreds. Owing to the shortage of small ponies for P. since the First World War, the regulation height of P. ponies is not now insisted on, but a pony should not be more than 15 hands. The best-known clubs near London are at Hurlingham, Ranelagh, and Roehampton. The Co. P. Association has a large membership of affiliated clubs, and the Irish Co. Club Union has also a large membership. The Eng. P. season is May, June, and July. In America and the Argentine, P. ponies are far less expensive than in England, and such proficiency have the Amers. reached in the game that they now number among them some of the finest of the world's players. The Amer. game is faster than the Eng., both with the pony and on the ball. Meadow Brook Club, where P. was first played in 1879, is the Hurlingham of America, and before the Second World War over 100 P. clubs belonged to the U.S.A. P. Association. In 1886 the first P. match was played between Great Britain and the U.S.A., and Great Britain won. The second match was played in 1900 and Great Britain again won, but since that date the U.S.A. have won every match. Owing to economic stringency following the Second World War the recovery of the game in England was slow, being handicapped especially by the lack of Argentine ponies. Thrown on indigenous resources there may be an opportunity for breeders of Anglo- or part-bred Arabs. It is, however, only in England that the game is in serious difficulties; in America in the spring of 1949 a series of international matches were played between the Argentine and America; in Italy the game has been revived at Rome and in Spain there is regular play at Madrid. There are more than forty clubs in S. Africa, and there is regular play in Malta. In England, however, there is P. sev. days a week at the surviving clubs, which also include (besides those mentioned above) Cowdray Park, Henley, the Ham Club (now at Petersham), the Rhinefield (in New Forest), the Taunton Vale club, Billericay, and others. Hints for playing P., its 'Rules and Regulations,' and the 'Rules of the County Polo Association' will be found in the *Encyclopædia of Sports and Games*; and a full hist. of the game, ancient and modern, is contained in *Polo, Past and Present*, 1895, by T. F. Dale. See also J. Moray Brown, *Riding in Polo*, 1891, and *Polo*, 1895, T. B. Dryborough, *Polo*, 1898, 1906; R. L. Ricketts, *First Class Polo*, 1928; and N. Bent, *American Polo*, 1929.

Polo Pony, see under HORSE.

Polo, Water, see WATER POLO.

Polonaise, stately Polish dance, originating in a ceremonial procession. The music is in three-four time, and the form

was a favourite with Chopin and other composers.

Polonium, first radio-active substance to be recognised by the Curies in 1898. Symbol Po; atomic number 84; approximate atomic weight 210. It was named after Poland, Mme Curie's native country. It is found in combination in pitchblende, and is identical with radium F. See RADIUM.

Polonnaruwa, second cap. city of anct. Ceylon from A.D. 769. Situated 76 m. N.E. of Kandy on the road to Trincomalee. Most of the historic ruins, which belong to the twelfth century, have been partially, or almost fully, restored, and they are in a better state of preservation than those of the older cap. city of Anuradhapura. Most impressive and spectacular, the remains at P. belong to a period when the famed Parakrama Bahu the Great made an epic of Ceylon hist. The city owed much of its beauty and magnificence to this great king, who combined the professions of warrior, student, artist, agriculturist, builder, and administrator.

In spite of the ravages of time and weather for the past eight centuries, much survives of the viharas, dagabas, monasteries, palaces, bathing pools, shrines, statues, and inscriptions in an oasis of ruins surrounded by forest inhabited by wild elephants, leopards, and other wild animals, and gay birds like the golden oriole and the paradise flycatcher. Among the ruins (some of which show evidence of Tamil influence in rich, architectural design), the Vata-da-ge' (round relic house), the Kalugala Vihara (black granite temple), the king's winter palace, the Rat-mahal-pasada (seven-storeyed palace), the royal lotus baths, the Kirita-Pabulu- and Rankot-Viharas, and the temples of Lanakattil-ke'. Jetavanaraina, and Thuparama need special mention. A mile away, on the other side of the P. resthouse, the large stone statue of King Parakrama Bahu (though some experts think it is that of a Hindu saint), holding an ola, or palm-leaf, MS. which was found among the ruins of the Potul Vihara (Parakrama's library) is of special interest. The city is also surrounded by large tanks (irrigation reservoirs) including the recently restored 'Parakrama Samudra,' which, besides presenting glorious scenic views, provide a most convincing indication of the advanced culture and high civilisation that then obtained in Ceylon. The ruins are a clear display of past glories and grandeur.

Polotsk, tn. and region in the Byelorussian S. S. R. The tn. is situated at the confluence of the Polota and Dvina, 62 m. by rail N.W. of Vitebsk. The prin. articles of commerce are flax, linseed, corn, and timber. Once a flourishing city, the continuous wars and the ravages of the plague have left but little of the original tn., and only ruins of the anct. castles now remain, and an eighteenth-century cathedral has replaced the older structure; while the more modern tn. suffered heavily in the fighting of 1944.

P. was an independent principality, with a prince ruling it until the twelfth century, falling under Lithuanian rule in 1320. After five sieges it was taken by Ivan the Terrible, 1563. It became Polish again in 1582, and after many vicissitudes became definitely Russian in 1772. P. was taken by the Ger. invaders in July 1911 and lost again three years later. See further under EASTERN FRONT, or RUSSO-GERMAN CAMPAIGNS, IN SECOND WORLD WAR. Pop. 21,000.

Poltaratsk, or **Poltorak** (formerly **Askabad** or **Askhabad**), cap. of the Turkmen S.S.R. It is a commercial and industrial tn. and linked by rail with Tashkent. It contains textile, glass, and meat-packing factories. Since 1881 it has been much westernised, but it retains an essentially Asiatic character. The pop. consists of mixed nationalities of Russians, Persians, Jews, Armenians, and Kurds, and numbers about 127,000.

Poltava: 1. Region of the Ukrainian S.S.R., with an area of 19,265 sq. m. The R. Dnieper forms its S.W. boundary, and the dist. is watered by its tribs, the Sula, Psol, Vorskla, and Trubezh. The surface is a level, sparsely wooded plain. The soil is fertile, and grain, potatoes and other vegetables, melons, tobacco, and sunflowers (for oil) are grown. Livestock is largely reared, and other industries are distilling, flour-milling, and tobacco manufacture. 2. Cap. of the above region, on the R. Vorskla, 70 m. S.W. of Kharkov. Cotton weaving is the chief industry; there are also woollen cloth mills. Peter I. defeated Charles XII. at P. in July 1709, and it was the centre of Khmelutsky's rising. It was captured by the Gers. in Sept. 1941. It became an important objective in the Russian-Ukraine offensive of 1943 after the recapture of Kharkov, but the Russians did not succeed in retaking P. until Sept. 23, after the three-day battle in the tn. Pop. (1939) 130,000.

Poltergeist (Ger. 'noisy ghost'), name given to an alleged ghost, agency, or spirit manifesting unpleasantly in a house. Identical phenomena attributed to Ps. have been reported from all parts of the world and throughout all ages. Classic alleged P. cases include the Drummer of Tedworth (1662), Epworth Rectory (the Wesley P.) (1716), Ballechin House (1892), and Borley Rectory (1929-39). The late Harry Price (q.v.) conducted extensive researches into the latter case and pub. two books on the alleged poltergeistic and other supernatural phenomena there, *Most Haunted House in England* (1940) and *The End of Borley Rectory* (1946), which should be consulted. P. disturbances include noises of every description, especially bell-ringing; movement, appearance and disappearance of objects; articles thrown about, strange smells, and fire-raising. Serious physical injury is rare, although on occasions great force is displayed. Hotels, rectories, farms, and cottages, old and new, are all apparently liable to infestation, which ceases after a period of time, sometimes a few days, sometimes years as suddenly

as it began and for no apparent reason. An adolescent is frequently a member of the household concerned and she (it is more often a girl than a boy) appears to be the nexus of the disturbances, apparent phenomena increasing when this person is asleep, a condition comparable to the spiritualistic trance state. (On occasions the disturbances are found to be the result of fraud, conscious or unconscious, on the part of the adolescent. Only rarely is P. phenomena accompanied by an apparition. See H. Dreisch, *Psychical Research*, 1933; W. H. Salter, *Ghosts and Apparitions*, 1938; E. Bennett, *Apparitions and Haunted Houses: a Survey of Evidence*, 1939; S. Sitwell, *Pollergeists*, 1940; and H. Price, *Pollergeists over England*, 1945.)

Polyænus, (Gk. author and rhetorician, of the second century, b. in Macedonia. He served in the army, and later entered political life. His chief work, *Strategemata*, in eight books, was trans. into Eng. by Shepherd, 1793.

Polyandry, homologue of polygamy, and therefore conveys the idea of one woman being the mother of children of more than one man. See FAMILY; MARRIAGE; POLYGAMY.

Polyanthus, spring flower (family Primulaceæ), of which many varieties, gold-laced, double, and self-coloured, have been raised. The P. is believed to have been originated as a cross between the primrose and the cowslip.

Polybius (c. 204-122 B.C.), historian of Rome, son of Lycortas, b. at Megalopolis in Arcadia. After the Rom. conquest of Macedonia, P. was conveyed to Rome with 1000 Achæans on the charge of refusing to assist the Romans against Persus (167 B.C.). The prisoners were settled in the Etruscan tns., but through the influence of Æmilius Paulus, P. was treated with exceptional leniency and was permitted to settle in Rome. Scipio offered liberal patronage to the exile, and granted him access to public records relative to his great work. P. accompanied Scipio on his campaign against Carthage. After the destruction of Carthage P. crossed to Greece, where his countrymen were in open rebellion against Rome, and secured lenient terms of peace for the defeated insurgents. The *History* of P. covers a period of Rom. hist. extending from the first Punic war to the destruction of Corinth. The hist. of P. is one of the most valuable works that has come down to us from antiquity; but unfortunately the greater part of it has perished. The first five books are extant, but of the rest only fragments and extracts remain. The best Eng. ed. is that of Shuckburgh (2 vols.). See J. P. Mahaffy, *Greek Life and Thought*, 1896; J. B. Bury, *Ancient Greek Historians*, 1909; and K. Lorenz, *Untersuchungen zum Geschichtswerk von Polybios*, 1931.

Polyeap, Saint (c. 69-156), bishop of Smyrna and one of the Apostolic Fathers. Knowledge of his life is gathered from Irenæus, Eusebius, and the anonymous *Martyrium Polycarpi*, partially incorporated into Eusebius's *Ecclesiastical*

History (iv. 15). He was visited by Irenæus as the latter passed through Asia Minor on his way to martyrdom at Rome, and from him, also, he later received an epistle. P. himself was the author of an epistle to the Philippians. Irenæus was indeed a pupil of P., while P. himself is said to have spoken with St. John the Apostle and to have been converted to Christianity by him in 80. Shortly before the end of his life, P. visited Rome to confer with Pope Anicetus as to the date for the celebration of Easter, and on his return to Smyrna suffered martyrdom at the stake, showing great courage and constancy. Eusebius places his martyrdom in the year 166, but modern research has made the date 156 more probable. See J. B. Lightfoot, *Apostolic Fathers*, II, 1877-85, and H. Rahner, *Die Märtyrer des zweiten Jahrhunderts*, 1941.

Polycarpon, genus of ann. herbs, with flat-whorled leaves and minute flowers in cymes. P. *tetraphyllum*, four-leaved all-seed, a small prostrate plant, is Brit.

Polycleus of Argos (fl. 440 B.C.), Gk. sculptor, pupil of the Argive sculptor, Ageladas, and a contemporary of Pheidias and Myron. See A. Mahler, *Polykelus und seine Schule*, 1902.

Polycotyledonous Plants, those which have more than two cotyledons, an uncommon condition almost confined to the Gymnosperms.

Polyrates of Samos (fl. c. 500 B.C.), Gk. tyrant. Having estab. a tyranny at Samos, he collected a fleet, mastered the Ægean, and by ubiquitous piracy amassed a great fortune. P., according to the legend, had formed an alliance with Amasis, king of Egypt, but the latter, fearing the continual prosperity of the tyrant, dissolved the alliance. P., to avoid the enmity of the gods, threw his most valuable possession, a ring of rare beauty, into the sea. The ring, however, was discovered in the maw of a fish which had been presented to the tyrant, and shortly afterwards P. was captured and crucified.

Polydeuces, see CASTOR AND POLLUX.

Polydorus: 1. King of Thebes, son of Cadmus and Harmonia. 2. Youngest son of Priam, was slain by Achilles. This is Homer's account, but later tradition gives a different account of his death.

Polyethylene, see under PLASTICS.

Polygalia, see MILKWORT.

Polygamy. The institution of P., which at the present day survives only among the Hindus, Muslims, Mormons (in doctrine at least), and a few unimportant races low in the scale of civilisation, will in every case be found co-existent with a marked inferiority of status as assigned to women. Everywhere it does survive it is quite an exceptional institution, kept up only in the teeth of the opposition of some dominant sovereign power; e.g. in Utah, the Morrill Act of 1862 and the Edmunds-Tucker Act of 1887 forbade P. and cohabitation with more than one woman as wife, and the Mormon Church has now abandoned the practice. In the hist. of the Church of Latter-Day Saints of Utah, the institution of P. was first openly

promulgated in 1850, and up to 1890 all the prominent members of that Church had plurality of wives. Utah was only admitted as a constituent state of the U.S.A. in 1896 on condition that P. should be prohibited by the Utah constitution. Among Hindus P. is virtually confined to the noble classes, for economic reasons. By Islamic law a man can have four wives, and any marriage in excess of that number will be dissolved by a judge on the woman's application. Apparently P. has almost died out among the Eskimos and the Chinese, where formerly it was widely prevalent. See MARRIAGE.

Polygenetism, see under LANGUAGE, ORIGIN OF.

Polyglot (Gk. *πολύς*, many, and *γλῶττα*, tongue), book which contains sev. versions of the same text in different languages, arranged side by side in parallel columns so as to facilitate comparison. By far the greater number of such works have been eds. of the whole or part of the Bible, and the term is usually applied to P. Bibles. In the absence of any express notice to the contrary. The oldest is the *Complutensian Polyglot* (1514-17), ed. in six folio vols., under the supervision of Cardinal F. Ximenes in Alcalá (the Rom. Comptum), in Spain; vol. i. contains the N.T. in Gk. and Lat.; vols. ii.-v. contain the O.T. in Heb., Vulgate, Septuagint (with Lat. trans.), the (Aramaic) Targum Onkelos (with Lat. trans.), and a Gk.-Lat. dictionary. The *Antwerp Polyglot* (1569-72, 8 vols. folio) included, besides the languages given in the *Complutensian Polyglot*, a Syriac version and the Targums on parts other than the Pentateuch, as well as dictionaries and archaeological treatises. The *Antwerp Polyglot* is also known as *Plantiniana* after the printer Plantin. The cost of its pub. was defrayed by Philip II. (of Spain), hence this P. is also called *Biblia Regia*. The editor of this work was the famous theologian Arias Montanus. The *Paris Polyglot* (1629-45, 10 vols.) gave another Syriac version (*Peshitta*), together with a version in Arabic (with Lat. trans.) and the Samaritan Pentateuch (with Lat. trans.). Most important of all is the *London Polyglot* (8 huge vols., 1654-57), to which the *Prolegomena* forms a most valuable addition. The *London Polyglot* was edited by Brian Walton (hence it is also known as Walton P.) and E. Castellus (prof. of Arabic in Cambridge); it contains all the material of the *Paris Polyglot*, and also parts of the *Vetus Latina*, of the Ethiopic and Persian versions (with Lat. trans.), sev. important treatises, in part an *apparatus criticus* (thus, being the only one amongst all the Ps. of any critical value), and readings of about thirty MSS. (In 1669, a lexicon *heptaglotton* was pub. by Prof. Castellus.) Of much less importance are a few Ps. ed. in Germany, such as the *Hamburg Polyglot* (1587 ff.) and the *Nuremberg Polyglot* (1599 ff.), ed. by Elias Hutton, the *Bielefeld Polyglot* (Heb., Gk., Lat., Ger.), ed. nearly a century ago by R. Stier and K. G. W. Thelle. **Polygnotus** (fl. 500-425 B.C.), Gk. painter, b. on the Is. of Thasos, came to

Athens in the time of Cimon, and was honoured with the citizenship. At Athens he executed mural paintings of the 'Sack of Troy' in the Stoa Poecile and of the 'Rape of the Leucippidae' in the shrine of the Dioscuri. His most famous works, however, were the 'Sack of Troy' and 'Ulysses in the Underworld' at Delphi. P. excelled chiefly in the delineation of character in the human face, and this quality of his work receives unqualified praise from Aristotle and other anc. critics. See H. E. Walters, *Greek Art*, 1903, and *The Art of the Greeks* (31st ed.), 1934.

Polygon, plane figure bounded by straight lines. The simplest P. is the triangle, but the name is usually restricted to figures with more than four sides, pentagons, hexagons, heptagons, octagons, etc. The general mathematical theory of plane Ps. defines them as any finite series of points joined in pairs by straight lines, which allows for forms with re-entrant angles and intersecting lines.

Polygonaceae, family of herbaceous plants, bearing leaves with sheathing stipules and spikes or panicles of flowers. Among the genera are *Polygonum*, *Phagopyrum*, *Rumex*, *Rheum*.

Polygonatum (Solomon's Seal), genus of herbaceous perennials (family Liliaceae), with handsome leafy stems and axillary bell-shaped flowers, followed by red or blue-black berries. Three species are Brit., and these and others are grown in gardens.

Polygonum, genus of herbaceous plants, the most important of which is *P. polygryum* (buckwheat), which is cultivated in N. America and Europe.

Polygon Wood, see under YPRES, BATTLES OF.

Polyhedron (Gk. *πολύς*, many; *ἵσα*, a base), in solid geometry a solid figure bounded by plane faces. Polyhedra are said to be regular when the faces are similar and equal regular polygons; there are five such forms, often known as Platonic solids. They are: (1) The regular *tetrahedron*, of which each solid angle is formed by three equilateral triangles; it has four faces, four vertices, and six edges. (2) The regular *octahedron*, of which each solid angle is formed by four equilateral triangles; it has eight faces, six vertices, and twelve edges. (3) The regular *icosahedron*, of which each solid angle is formed by five equilateral triangles; it has twenty faces, twelve vertices, and thirty edges. (4) The cube, or regular *hexahedron*, of which each solid angle is formed by three squares; it has six faces, eight vertices, and twelve edges. (5) The regular *dodecahedron*, of which each solid angle is formed by three regular pentagons; it has twelve faces, twenty vertices, and thirty edges.

Polyhymnia, muse, who favoured eloquence, vocal music, and mimicry.

Polymerism, term used in chem. to denote the phenomenon shown by those compounds that have the same empirical formula but different molecular weights, those with the higher molecular weights

being directly obtainable from those with the lower. Thus paraldehyde, $C_3H_5O_3$, is a polymer of acetaldehyde, C_2H_4O , since it has the same atoms in the same ratio, and is directly obtainable from acetaldehyde. Similarly, benzene, C_6H_6 , is a polymer of acetylene, C_2H_2 . On the other hand, acetic acid, $C_2H_4O_2$, is not a polymer of formaldehyde, CH_2O , since, although it has the same atoms in the same ratio, it cannot be directly obtained from formaldehyde. Some polymers with very large numbers of atoms in their molecules ('macromolecules') are the basis of many modern synthetic fibres. Another, polyethylene (*q.v.*), is an excellent insulator. See also PLASTICS.

Polymethyl Methacrylate, *see under* PLASTICS.

Polynesia, properly the E. Pacific Is., comprising a number of distinct archipelagos of small is. within 30° N. and 35° S. of the equator, and between 135° E. and 100° W. long., roughly within a triangle, bounded by the Hawad Is. in the N., New Zealand in the S.W., and Easter Is. in the S.E. The term P. is sometimes restricted to the groups most centrally situated in the Pacific (comprising the archipelagos of Hawaii or the Sandwich Is., Union or Tokelau Marquesas, Samoa, Tonga, Society, Cook, Tubuai, Kermadec, Tuamotu, and the isolated Easter Is.); the S.W. group of the archipelagos is classed as Melanesia (comprising the Fiji Is., the New Hebrides, the Solomon Is., New Britain, New Ireland); whereas the N.W. group forms Micronesia (Marshall, Mariana, Caroline, Gilbert, Ellice, and many lesser Is.). The Is. may be divided into two chief classes, volcanic (such as the Friendly, the Marquesas, the Hawaii) and coral is. (Caroline, Gilbert, Marshall, Society, and others); the volcanic rise to a great height (Mauna Loa, in Hawaii, 13,600 ft., is the highest peak in the Pacific), the coral do not exceed 500 ft. in height. Although lying in the torrid zone, most of the Polynesian Is. have a comparatively moderate temp. owing to the influence of the ocean, and on many is. the climate is delightful and salubrious. Most of the is. are Brit. The only independent native kingdom now surviving in the Pacific is Tonga Is., a Brit. protectorate. The 'kingdoms' of Hawaii and Tahiti belong respectively to the U.S.A. and to France. Also the Samoa Is., Howland, Baker, Palmyra, Jarvis, Johnston, and many other is. belong to the U.S.A., while Marquesas, Paumotu, Society, Tubuai, Wallis, Futuna, and others belong to France. Easter Is. belongs to Chile. The commercial products of P. consist chiefly of coco-nuts, bread-fruit, fruits, sugar, bananas, cotton, coffee, pearls, and trepang.

The indigenous pop. of P. in the widest sense of this term, may be divided, according to the aforementioned geographical distribution, into three races, distinct in physical type, speech, and customs, the Polynesians, the Melanesians (*see under* MELANESIA), and the Micronesians (*see under* MICRONESIA). The Polynesians are a well-proportioned,

tall (indeed one of the tallest in the world), brown-skinned race of seamen, who, according to some scholars, might be called the vikings of the Pacific. They depend for their food largely on a combination of gardening and fishing, and drink *kava*, made from pepper root. Their clothing is mostly of bark cloth, painted with various designs. They are clean, intelligent, friendly, and cheerful, and have a rich sense of art. They are fond of music, dancing, songs, and other amusements, as well as of swimming and athletic pursuits. The indigenous musical instruments are flutes (blown with the nose), wooden gongs, and bamboo cylinders. The Polynesians, unlike the Micronesians, have not learnt the art of weaving, but they are skilled in the arts of war and navigation. They build well both canoes and houses, which vary a great deal from is. to is., and their wood and stone carving is developed and elaborate.

The Polynesians speak various languages or dialects, belonging, however, to the same linguistic family. The main characteristics of the Polynesian languages are as follows. They have only eight or nine consonantal sounds and five vowels; every syllable and word end with a vowel. There is, however, a wide vocabulary. Only one of the is. of P. has a native script—the isolated Easter Is. (*q.v.*).

The Ladrões were discovered by Magellan in 1521, the Marquesas by Mandaña in 1595, Easter Is. by the Dutch admiral J. Roggeveen on Easter day, 1722, but it was not until 1767 that Wallis, and subsequently Cook, explored and described the chief is. What is known of the previous hist. of P. has been learnt from Polynesian chiefs, and it is very little. The 'well-educated' youngsters had to learn by heart their family tree (sometimes as far back as twenty generations or more), and the prin. exploits of their more important ancestors: these traditions tell us of the discovery of many is.; of the voyage of U-taranga to the Antarctic seas (A.D. 650), and of the voyage 300 years later of Te Aru-tangahau, who 'reached the land of snow and described icebergs'; also perhaps of the discovery of the W. coast of N. America, of long romantic voyages in search of wives, and so forth, but next to nothing of the origin and the hist. of the Polynesians. The following are the main modern theories on these problems, but none of them is quite satisfactory. According to one theory the Polynesian ancestors were of Indo-European origin, they left N.W. Europe during the Old Stone Age before pottery was invented. They crossed Asia and occupied Japan, from which they were driven by the Ainu, another Caucasoid race. They then moved S. over the chain of is. that led to the Pacific. These is. must then have been much larger and more plentiful. Amongst the many things which point to their probable Indo-European origin, the following are mentioned: (1) Their stature, physique, and colouring, and the fact that a blond strain persists, coupled with their tradition

of a blond ancestry who came from a land where the trees are leafless half the year and men walk on the water; (2) their mythology is supposed to show Indo-European affinities; and (3) their language is supposed to be akin to Indo-European forms of speech. As a matter of fact, there is very little in common between the Polynesian and the ancient Indo-European mythologies and languages, and it is rash to assume as certain that the paleolithic pop. of N.W. Europe was of Indo-European speech or race.

The second main theory asserts (see, for instance, S. P. Smith, *Hawaiki: the Original Home of the Maori*, 1904) that the parent stock of the Polynesians can be traced to India about 450 B.C., and that a migration to Java took place in 85 B.C. All these early dates are very problematical. It is more probable that the Polynesians have ethnical affinities with the Malaysans. From the linguistic point of view, these affinities may be considered as certain; the inhab. of P. and of the Malay Archipelago speak languages and dialects of a single general stock known as Malayo-Polynesian, one of the most widespread linguistic families in the world. Its hundreds of branches extend all the way from Madagascar through the E. Indies and the Philippines to Formosa in the N. and to New Zealand in the S., and across the Pacific to Hawaii and Easter Is.

The later hist. of P. seems easier to trace. Apparently c. A.D. 600 Polynesians were living in Tonga-nui and Samoa. Hawaii seems to have been settled c. 650 and Marquesas probably one generation later. In 850 New Zealand was visited, and the definite occupation of this region by 'the Fleet' took place in 1350. Hawaii was visited in 1100 and 1225, but all voyages to that group seem to have ceased after 1325. When the Europeans arrived the Polynesians had still the stone-age culture, i.e. they had not discovered metals and depended on stone tools; their prin. weapon were clubs, and they also used slings and sling-stones. They had no wheels and no pottery. They worshipped many chief or high gods, including the creator god Tane, the war god Oro, and the fish-god Tangaroa, and many lesser gods, spirits of natural forces, of trees, etc. The priests were a powerful body. Sacrifices (including human ones) were made, and cannibalism was not unknown (e.g. in the Marquesas Is.). Nowadays they are nominally Christians. Since their first contact with Europeans their numbers have declined sharply, mainly through tribal warfare, epidemic diseases, tuberculosis, and leprosy; it is thought that their collective number has fallen from over 1,000,000 to about 150,000; but to-day, especially in New Zealand, they appear to be increasing. See C. Fernalder, *Origin of the Polynesian Nations*, 1885; G. M. Brown, *Maori and Polynesia*, 1907; T. R. St. Johnston, *Islanders of the Pacific*, 1921; J. M. Brown, *People and Problems of the Pacific*, 1927; E. S. C. Handy, *Sources of Polynesian Culture*, 1931; R. W. Wil-

Iamson, Religion and Social Organisation in Polynesia, 1937; Sir H. Juko, Britain and the South Seas, 1945, and From a South Seas Diary, 1938-42, 1945; and R. Gibblings, Over the Reefs, 1948.

Polype, name given to various members of the group Coelenterata, typified by the common fresh-water hydra, which is tubular in shape, one end being attached to a solid aquatic object and the other having a small mouth surrounded by slender tentacles. Its colour is green, due to the symbiotic presence of green algae containing chlorophyll. A more familiar type is coral (*q.v.*).

Polypheusus, in Greek mythology, chief of the Cyclopes (*q.v.*) son of Poseidon and Thoon. He dwelt in a cave in S.W. Sicily, and when Odysseus and his companions were wrecked there on their return from Troy, he imprisoned them and devoured many of them. Finally, Odysseus succeeded in making the giant drunk and blinding him, and in escaping from the cave with his comrades by clinging to the sheep and goats as they were let out to pasture. A later story relates the love of P. for Galatea, and his slaying of her beloved Acis.

Polyphony, combination of two or more melodies or melodic strands in such a way that they make musical sense. It is essentially the same as counter-point, but the latter term is used more specifically for the scientific way of writing P. and applying it to musical composition.

Polypí, *see under* NOSE.

Polyploidy, see under VARIATION, IN BIOLOGY.

Polypus, tumour possessing a stem, or **pedicle**, by which it is attached to a tissue surface. Polypi are usually found on mucous membranes, as in the nose, bladder, uterus, rectum, etc. The most satisfactory treatment in most cases is to remove them by forceps or ligature. Radium can be applied to prevent a recurrence.

Polystyrene, see under PLASTIC.

Polythalamia (Gk. πολύς, many, θαλαμοί, chamber), term applied to those species of marine rhizopods in the family Testacea which are many-chambered. The term is used in opposition to Monothalamia, containing the single-chambered species.

Polytheism (Gk. πολυς, many, and θεός, god), belief in many gods, as opposed to monotheism or atheism. Some authorities hold that it is a degradation of monotheism, others that it preceded monotheism, being necessary stage in the evolution of the religious spirit. In certain of the great nations of antiquity, such as Assyria, Babylon, Rome, and Greece, it is to be found in a highly developed form. The same state exists in modern India. Many passages in the O.T. show how difficult it was for the Israelites to free themselves from polytheistic practices.

Polytonality, system of composition of the twentieth century, the principle of which is that music may be written in sev. keys at once.

Polytrichum, genus of acrocarpous mosses. *P. commune*, a handsome moss

with almost woody stems, occurs on heaths and moors.

Polyvinyl Chloride, see under PLASTICS.
Polyzoa, or **Eryzoa** (moss animals), group of plant like animals, which, with the exception of a single genus, form colonies, which arise by the continual budding of the cells. The majority are marine, but many occur in fresh water. The colonies exhibit wide variation in form and habit, occurring as crusts on rocks as masses, broad fronds branched growths, etc., and the texture and consistency may be gelatinous, horny, and flexible, or stony. Many are of great beauty. A typical form is *Plutea foliacea*, the broad leaved hornwrick or sea mat, common in heaps of seaweed cast up on sandy Brit. coasts. Its brown horny fronds branching from a narrow flat stem are reticulated with little oblong boxes or cells (zoecia) through a lid in which a cinct of tentacles emerges to set up currents which convey food to the mouth. Reproduction is by means of eggs which hatch into ciliated embryos, each of which after a few hours free swimming settles down and by budding gives rise to a new colony. An example of a fresh water species is *Lumatella repens*.

Polzin, see POLZYN ZORÓI.

Pomaceae, or **Pomew**, one of the tribes of the family Rosaceae. Among its genera are *Pyrus* which includes the apple and pear, *Cydonia* (quince) and *Cotoneaster*. See FAMIL.

Pomaria, see PIMARIA.

Pome, in botany false fruit being formed from the receptacle of the flower which grows up to surround the true fruit or core itself developed from the ovary.

Pomegranate (*Punica granatum*) hard some deciduous tree (family Lythraceae). Though a native of Persia it is often grown in the open in Britain for the beauty of its scarlet flowers. The tree is sufficiently hardy for ornament but unless protected does not produce the reddish yellow fruit the seeds of which are medicinal. Various parts of the tree have medicinal value.

Pomerania (Ger. **Pommern**, Polish **Pomorze**), former ter. of Germany and maritime prov. of Prussia whose Baltic coastline stretched from Prusitz W. of the gulf of Danzig to Ahrenshoop about 30 m. W. of Stralsund. It was 11,622 sq. m. and its pop. in 1939 was 1,920,000. Its main divs. were Vorpommern and Hinterpommern but actually there were three dists. Stralsund, Stettin (Szczecin) and Koslin (Koszalin). After the Second World War the greater part of the ter. was assigned to Poland, whose new W. frontier in relation to P. was found by the Oder. P. is flat except for a low range of hills in the E., the prin. rivs. are the Oder, the Pene, the Ucker and the Ihna. Off the W. coast are the is. of Rugen, Usedom, and Wolin. There are numerous lakes. Agriculture is the chief occupation. Shipbuilding is carried on at Szczecin. Governor of P. was one of the titles of the heir to the Prussian crown. In the Second World War the Russians

under Marshal Zhukov crossed into P. on Jan. 28-31, 1945. Szczecin fell on Feb. 28. The Russians reached the Baltic at Kolberg (Kolobrzeg) on March 4 but that in did not fall until March 18. The advance in P. was delayed by the tenacious Ger. resistance at Königsberg (K. Prussia), which was not taken until April 9. Thereafter the Russians advanced to the Oder. Szczecin was occupied on April 26. It was attacked on the flying bomb and rocket experimental station at Peenemünde (and others) delayed the launching of the robot offensive by six months. See further under EASTERN FRONT or RUSSO GERMAN CAMPAIGNS IN SECOND WORLD WAR.

Pomeranian Dog, bred common in many parts of Europe especially Germany, where it is known by the name of *Spitz*. The Ger. claim it as one of their national breeds but it is certain that, wherever it originated, it is a N. or



POMERANIAN DOG

I Fu

Arctic breed. The P. D. became popular in England during the latter half of the nineteenth century owing to its being a favourite with Queen Victoria. It is a well-knit dog with fox-like face and head, small erect ears, and intelligent expression. It may be either pure white, black or brown. The early type weighed from 20 to 25 lb. but through the exertions of breeders many now weigh under 8 lb. Toy Poms have been growing in popularity during the last thirty years.

Pomeroy 1. Par. indiv. of *Cotoneaster* N. Ireland. 2. S. in NW. of Dunstan. 3. A. d. in Lustris is a climbing. 4. Top 3100. 5. Cap of Mt. S. Ohio U.S.A. on the Ohio betw. Pittsburgh and Cincinnati. Pop. 1000.

Pometinæ Paludes under POMTINE MARSHES.

Pommern, see POMERANIA.

Pomona, Rom. goddess of the fruit trees. *Pomorum Patrona* believed of rustic deities like Vertumnus and Silvanus. See Ovid, *Met. morphoses* xiv. 623, 11. peritus iv. 2.

Pomona, correctly Mainland largest of the Orkney Is. off the N. of Scotland, divided by Kirkwall Bay and Scapa Flow into two main parts (E. and W.). The

name Pomona is the result of G. Buchanan's misapprehension of a Lat. text, and is never applied to the is. by Orcadians. The surface is mountainous, but has fertile tracts, and lochs abounding in trout. Stromness Harbour (W.) is the best in N. Scotland, situated N. of Hoy Sound. Between the tns. of Kirkwall and Stromness are the Standing Stones of Stenness (Stennis) and Maes Howe with runic inscriptions on the wall (see Scott's *Pirate*). The Pictish vil. of Skara Brae is on the bay of Skail, 8 m. from Stromness. The chief occupations are agriculture and fishing. The climate is mild. Scapa Flow, the headquarters of the Brit. fleet during the First World War, lies between Hoy and S. Ronaldshay, and here the surrendered part of the Ger. fleet was scuttled by von Reuter's orders, June 21, 1919. Area 150 sq. m. Pop. 22,000.

Pomona, banking city and health resort of Los Angeles co., California, U.S.A., in the San Bernardino valley, 2 m. from Spadra, with extensive fruit, vegetable, and wine industries. P. College (opened in 1888) is nearby. Pop. 21,000.

Pomorze, see POMERANIA.

Pompadour, Jeanne Antoinette Poisson, Marquise de (1721-64), mistress of Louis XV., b. in Paris. The king estab. her at Versailles in 1745 and bought her the estate of P., from which she took her title. Here she at once became the leader of a brilliant artistic and literary circle, amongst whom figured Voltaire, Quenon, Boucher, Vauclon, Greuze, and many other noted men. She became the patroness of learning and arts, and soon turned her attention to state affairs as well, filling the most important offices with her favourites, and making and unmaking, by turns ministers, diplomats, and generals. No one obtained office except through her, and, like Mme de Maintenon, she prepared all business to come before the king with the ministers. An Eng. trans. of her letters from 1753 to 1762 was pub. in 1771. See J. B. Capetigue, *Mme la Marquise de Pompadour*, 1858; H. Bonhomme, *Mme de Pompadour, general d'armée*, 1880; P. de Nolhac, *La Marquise de Pompadour*, 1904; life by A. Leroy, 1938; and study by D. B. Wyndham Lewis in *Four Favourites*, 1948.

Pompeia, third wife of Julius Caesar, whom she married in 67 B.C., and granddaughter of Sulla. Clodius had an intrigue with her, and when in 61 his presence was discovered in Caesar's house during the celebration of the mysteries of the Bona Dea, Caesar divorced P. (61). See Suetonius, *Caesar*, vi.

Pompeii, ant. tn. of Campania in Italy, 2 m. from the shore of the bay of Naples and situated at the foot of Mt. Vesuvius. There is very little of its hist. recorded before 79 B.C. It was not originally a Gk. colony. Strabo asserts it was first occupied by Oscans, afterwards by Etruscans, and lastly by Samnites; it was one of the last to be reduced by the Romans. A military colony was settled there and the pop. rapidly became romanised. It grew into a fashionable place for Rom.

nobles, who possessed villas in the neighbourhood. The city took a prominent part in the Social war (91-89 B.C.), and withstood a siege by Sulla. The industrial part of the pop. was chiefly employed in wine making and manufacturing millstones out of lava. In A.D. 63 an earthquake destroyed a large part of the tn., and the inhab. were actively repairing and rebuilding their city when the whole place was overwhelmed by the great eruption of Vesuvius in A.D. 79. The city was entirely buried by cinders, stones, and ashes, and over 2000 persons perished. The younger Pliny gives a description of the eruption, but not of the destruction of the tn., although his uncle perished there. During the Middle Ages the very site of the city was forgotten; vineyards and mulberries grew over the ground and obliterated all that was left. In 1594, during the construction of an underground aqueduct, two inscriptions were found, and a little inspection proved the fact that the ruins of a considerable place lay entombed in the soil. In 1763 systematic excavations were commenced. Since 1861 the It. Gov. has carried forward the work on a system devised by G. Fiorelli, and the greater part of the whole tn. has now been unearthed. The chief buildings of interest are the great amphitheatre to seat 20,000 persons, one of the finest that has been discovered; the forum, with the public buildings on all sides of it; the paved way to the forum which was for foot passengers only and adorned with many statues; the temples of Jupiter, of Apollo, of Isis and Zeus Mithraeus, of Vespasian and Fortuna Augusta, and the Doric temple which stands in another forum, with a large and a small theatre adjoining, and three separate estab. for public bathing, with the complete apparatus for hot and cold water, etc. Joining the theatres were the barracks of the gladiators, where objects of personal use were discovered just as they were left on the day of destruction. The streets with their shops and houses have now been unearthed, and among the most interesting of these are the house of the Vettili, the house of the Faun, and the mansion of Sallust, etc. In the street of Abundance, one of the winesellers' shops contained all the vessels and pots and pans for daily use in good preservation. The private buildings are of great interest because of the light they throw on the domestic side of Gk. and Rom. life of that period. Of the numerous objects of art found, many are very beautiful, though inferior to those found at Herculaneum, and some of the green bronze statues are of exceptional workmanship, among them the dancing Faun and that called the youthful Bacchus or Narcissus. Many of the mural paintings and fresco works are of high artistic excellence. The mosaics especially call for attention. The most complete and beautiful was found in the house of the Faun, representing Alexander at the battle of Issus, now in the museum at Naples, where practically all of the movable artistic objects were placed. Great care has been taken to pre-

serve the remains of the upper storeys, with their balconies and pillared openings, and these assist largely in giving a true picture of the architecture and house-planning of the time. The volcanic matter that buried the city and suffocated the people as they tried to escape preserved the very forms of the men and women, whose bodies were practically moulded into the mixture of ashes and cluders that later formed a plaster to preserve the very attitudes and costumes in which the people died. The house of the Vettii has been restored as far as possible to show the actual conditions in which the wealthier classes of P. lived at that time. Excavations in 1921 on the N.E. side disclosed, among the more interesting objects, sev. fine paintings, including a large one of the twelve custodians or penates of P.; a house with the remains of a balcony on the first floor; a bar or thermopolium; and two beautiful porticoes, almost intact, and a pergola above four shops. These pictures were discovered at the *compita*, i.e. street-crossings, which were held sacred and generally marked with sacred pictures and an altar. Below one such *compitum* was found an altar of masonry, built into the wall, on which were still preserved the ashes of the last sacrifice that was held before the fatal Aug. 24, A.D. 79. The bar is interesting for its many terra-cotta amphore found still fixed in the ground and for its furnace situated at the end of the counter. Above the furnace was found a cauldron in which remained some liquid placed there on the day of the catastrophe. This bar was no doubt much resorted to, because on its walls were found many election manifestoes, one being on behalf of a man named Lollius, and between each letter of his name were smaller letters announcing that he was a *duumvir* who looked after the streets and the sacred buildings. The pergola is situated above four shops and is almost intact. In the entrance to one of the shops were found the remains of a little staircase leading up to the pergola.

Another well-preserved building has a fine crypto-portico of three long corridors facing on to a garden. The walls of these corridors still retained their decorations, which take the form of imitation encaustic marble slabs dating from the second century B.C. During excavations in 1941 some 465 inscriptions, figures, and sketches on the columns of the palaestra (gymnasium) were discovered. At the same place the excavators found the skeletons of eighty-five people killed or buried by volcanic debris while fleeing for safety. Near these remains was also found a case containing surgical instruments for oculistic operations, sev. of them in a very good state of preservation. P. was bombed in the Second World War and damage was done, especially in the area of Nuovo Scavi. See A. Mau, *Pompeii in Leben und Kunst*, 1900 (Eng. trans., 1902); A. Plea and W. Mackenzie, *Pompeii*, 1910; H. Engelmann, *New Guide to Pompeii*, 1925; R. C. Carrington, *Pompeii*, 1936; A. von Gerkauf, *Der*

Stadtplan von Pompeii, 1940; and F. Krichen, *Die Stadtmauern von Pompeii*, 1911.

Pompeius, or Pompey, Cn. Pompeius Magnus (106-48 B.C.) (Pompey the Great), son of Cn. Pompeius Strabo. At the age of seventeen he fought under his father against the It. allies. When the Marian party obtained the upper hand at Rome, P. raised an army and opposed the Marian generals with great success. In the year 81 B.C. P. engaged in a successful campaign in Africa against Cn. Domitius Ahenobarbus and the Numidian king, Juba. It was on his return from this campaign that Sulla honoured P. with the surname *Magnus*. In 76 B.C. P., as proconsul, crossed to Spain in order to quell the rebellion of Sertorius, but his campaign was unsuccessful until Sertorius was treacherously murdered by one of his own officers in 72 B.C. In a few months after the death of the rebel leader, Spain was completely subdued. P. now repudiated his aristocratic policy and identified himself with the popular faction. During this phase of his political life he came into close touch with Julius Caesar, and a coalition was formed between these two leaders and Crassus. In 67 B.C. P. was appointed to the command against the pirates with extraordinary power, and in six weeks he swept the Mediterranean sea of the piratical menace. In 66 B.C. P. was given command against Mithridates, and victory was easily secured, as the power of the Pontine king had already been broken by the arms of Lucullus. P. then pursued his victories E. In 64 B.C. he subdued Antiochus, king of Syria, and estab. a Rom. prov. in the kingdom. In 63 B.C. he marched into Phoenicia and Palestine and captured Jerusalem after a siege of three months. In 62 P. entered Rome on his third triumph. The Senate's action in refusing to ratify P.'s measures in Asia brought him into closer touch with the popular party and cemented the agreement between P., Caesar, and Crassus. This coalition became known as the first triumvirate, and the aristocratic party for a time was completely overruled. The marriage of Caesar's daughter Julia with P. drew closer the bonds of union. Caesar's continued victories in Gaul, however, were fatal to P.'s supremacy in Rome, and the union of the two great leaders became merely nominal. The death of Julia (51 B.C.) and the fall of Crassus in the Parthian expedition (53 B.C.) further loosened the bonds. P. now aimed at the dictatorship, and by encouraging civil strife secured his election as sole consul in 52 B.C. In the civil war which followed between Caesar and P., the latter affiliated himself to the aristocratic party. The decisive battle was fought at Pharsalus in 48 B.C., and Caesar became master of the Rom. world. P. fled to Egypt, but while landing he was stabbed by Septimius, his former centurion (48 B.C.). See Sir C. Oman, *Seven Roman Statesmen*, 1902, and E. Meyer, *Cæsars Monarchie und das Principat des Pompeius*, 1922.

Pompey's Pillar, fine monolith of red granite, erected in the Serapeum at Alexandria in Egypt at the beginning of the fourth century A.D., and dedicated to the Emperor Diocletian. It took its name through its site being confused with that of Pompey's tomb.

Pom-Pom, name given during the S. African war to a large calibre Maxim quick-firing gun used by the Boers. Two-pound P.-Ps. were first mounted in destroyers in 1913. After the First World War multiple-barrelled P.-Ps. were developed as part of the close range anti-aircraft armament of Brit. ships, each barrel firing 200 rounds per min.

Pomponius Atticus, see ATTICUS, T. POMPONIUS.

Pomuk, John of, see JOHN, ST.

Ponani, seaport trading in salt, at the mouth of the Ponani, 38 m. S. by E. of Calicut, in the Malabar dist. of Madras, India. Pop. 15,000.

Ponapé, see CAROLINE ISLANDS.

Ponce (so called after P. de León), seaport, 50 m. S.W. of San Juan, on the S. of the is. of Porto Rico. It is the centre of a dist. growing sugar-cane besides cacao and tobacco, and itself manufs. sugar and molasses, etc. P. has a fine harbour and a cathedral. Pop. 65,200.

Ponce de Leon, Juan (1460-1521), Sp. explorer, b. at Servas, León. He accompanied Columbus on his second voyage, in 1493, and was appointed lieutenant to the governor of Hispaniola. In 1508, having received intelligence from the natives that the neighbouring is. of Boriquen, or Porto Rico, abounded in gold, he succeeded in conquering it after many hard-fought battles, but was superseded in the command of the conquered country. The Sp. consul of the Indies in 1509 appointed P. de L. governor, and later 'captain,' of the is. of San Juan (i.e. Porto Rico), but Diego Columbus (son of Christopher) protested against this appointment as an infringement of his rights. He next appears to have conceived the idea that there was yet a third world to be discovered; but he decided to sail first to a certain is. of the Bahama group, called Bimini, where, according to a tradition, there was a fountain possessing the power of restoring youth. He did not, however, discover either the is. or the fountain, but came in sight of what he supposed to be an is., which he called Pascua Florida. P. took possession of the country in the name of Ferdinand and Isabella. In a subsequent expedition he came upon the W. coast of Florida, where he made a descent, but was fatally wounded by the Indians. P. de L. was the first early governor of the new Sp. colonies to be promised by the crown the title of *adelantado*, an old one belonging to the medieval policy of Castile. See O. H. Haring, *The Spanish Empire in America*, 1947.

Ponce de León, Luis (1520-91), Sp. poet and theologian, b. of noble parentage at Belmonte del Tajo. In 1581 he was elected to the chair of theology at Salamanca. He was imprisoned from 1572 to 1577 by the Inquisition on account of

his prohibited trans. of the Song of Solomon. In his fine prose poems *De los Nombres de Cristo* (1583-85) and *La Perfecta Casada* (1583), as well as in his charming lyrics, such as *La Noche Serena* and *De la rida del cielo*, will be found a rare blend of Gk. purity and Heb. passion. See life by A. F. C. Bell, 1923, and A. G. Palencia, *Frays Luis de León en la poesía castellana. Historias y leyendas*, 1942.

Poncho, sort of cloak with a hole for the head, worn by the Indians of S. America, and also by many of the Sp. inhab. It resembles a narrow blanket with a slit in the middle through which the head passes, so that it hangs down loosely before and behind, leaving the arms free. Catamarca, cap. of the small Argentine Andine prov. of the same name bordering on Chile, is famous for the handweaving of P's.

Pond, John (1767-1836), Eng. astronomer-royal, attained that office in 1811. He revolutionised almost all the methods of observation by availing himself of mural circles and reflected vision.

Pondichery, or **Pondicherry**, cap. of Fr. India, with an area of 115 sq. m. and a pop. of 222,600. It lies on the Coromandel coast, 122 m. by rail S. of Madras. A canal separates the white from the black tn. There are native dye-works, three cotton-mills, and many weaving estabs. Oil-seeds, rice, and cotton materials are the staple exports. The tn., which is well laid out, and which draws its water supply from artesian wells, was founded in 1674. After Eyre Coote captured P. from Lally in 1761, it was many times temporarily in the hands of the Eng. At P. is the residence of the governor of the colonies. One senator and one deputy represent the colonies in the Parisian Parliament. During the Second World War P. declared for Gen. de Gaulle and was used as a base for allied operations against Japan. Pop. 54,000.

Pondoland, so called from a Kafir people, the Pondo, lies N.E. of Tembuland, between the Indian Ocean and the Kwanthlamba Mts. in S. Africa. Since 1894 has been annexed to Cape Colony. The vegetation is luxuriant. Pottery, basket-work, and wood-work are the best industries. Money has now been absorbed into Pondo culture and is commonly used in transactions between Pondos. In 1930 P. instituted its own agric. training school at Flugstaff. The school is now under the United Transkeian Terc. Council. Area 3918 sq. m. Pop. 210,000. See M. Hunter, *Reaction to Conquest*, 1936.

Pondweed (*Potamogeton*), genus of floating or submerged plants (family Najasaceae) with leathery leaves and spikes of small green flowers. More than half the known species occur in Britain; among the most common are *P. natans*, *P. polygonifolius*, *P. lucens* (the largest Brit. species), with leaves from four to ten in. long, *P. crispus*, and *P. densus*.

Poneyezh, tn. in the Lithuanian S.S.R., 86 m. N. of Kovno (Kaunas). It has a large trade in flax and wheat. Pop. 15,900.

Ponnani, seaport of Madras, India, on the Malabar coast, at the head of the riv. of the same name. It is connected by road to Tirur. Pop. 19,100.

Ponsonby of Shulbrede, Arthur Augustus William Harry Ponsonby, first Baron (1871-1946), Eng. author and politician, educated at Eton and Balliol College, Oxford. Entering the diplomatic service in 1891, he was abroad for three years and at the Foreign Office from 1899 to 1902. In 1908 he was elected Liberal M.P. for Stirling. His political life was governed by his efforts for peace, and his advocacy of a negotiated peace during the First World War lost him his seat in Parliament in 1918. He became Labour M.P. for Brightside (Sheffield) in 1922, and held office during the Labour Govs. of 1924 and 1929, being raised to the peerage in 1930. Following differences over foreign policy, he resigned from the Labour party in 1935 and devoted himself to the activities of the Peace Pledge Union. As a literary historian he made a close study of diaries written since the sixteenth century, and the results of his researches were pub. in *English Diaries* (1923), *More English Diaries* (1927), and *Scottish and Irish Diaries* (1927). His political writings include *The Decline of Aristocracy* (1912), *Democracy and Diplomacy* (1915); *Wars and Treaties, 1815-1914* (1917); *Now is the Time* (1925); he also wrote a life of his father (1912). His personal beliefs were expressed in *Life Here and Now* (1936).

Ponsonby, Sarah, see BUTLER, LADY ELEANOR.

Ponsonby, Vere Brabazon, see BESSBOROUGH, EARL OF.

Pons Winnecke Comet, see under COMET.

Ponta Delgada, cap. of St. Michael's Is. in the Portuguese Azores. It is a cathedral city, health resort, and port. Cotton fabrics, straw hats, spirits, and pottery are manufactured. Pop. 21,100.

Pontai, see PONZA.

Ponta Grossa, tn. of Brazil, in Panama state, 200 m. from São Paulo. It is a communications centre for its dist., and produces beef, cattle, tobacco, rice, and bananas. A great deal of timber and yerba maté from P. G. is exported from Paranguá. Pop. 41,100.

Pont-a-Mousson, tn. in the dept. of Meurthe-et-Moselle, France, 17 m. N.N.W. of Nancy. There are furnaces, ironworks, and a communal college. It has many historic buildings. It had strategic importance in the Franco-Prussian war, since it guarded a Moselle bridge.

Pontarlier, frontier tn. and railway junction in the dept. of Doubs, France, 35 m. S.E. of Besançon. It has paper manufs. and trade in cheese and cattle. Clocks are also made. Pop. 12,700.

Pont du Gard, vil. in the dept. of Gard, France, 16 m. W. of Arignon. Here the Gard is crossed by a fine Rom. aqueduct with three tiers of arches, one above the other. The famous cave of La Vache-pétrière, discovered in 1871, is near by.

Ponte, Giacomo da, see BASSANO.

Pontefract, or **Pomfret**, tn. and bor. constituency 13 m. S. of Leeds, in the W. Riding of Yorkshire, England, near the

junction of the Rs. Aire and Calder. Tanning, brewing, corn-milling, iron-founding, are the chief industries and there is coal-mining in the vicinity. Liquorice is still grown in large quantities for the famous 'Pontefract' or 'Pomfret' cakes. There are ruins of the Norman castle (founded in 1069), where Richard II. and Earl Rivers were put to death. The first bor. charter was granted at the end of the twelfth century by Robert de Lacy, a descendant of the man who received the honour of P. from William the Conqueror. Pop. 23,800.

Pontevedra: 1. Densely populated prov. of N.W. Spain, having an area of 1695 sq. m. It is well watered by the Minho, Ulla, and other rivs., all of which flow to the Atlantic. The inhab. depend on the fisheries and on agric. produce, which grows well in their fertile though mountainous country. Vigo is the chief port. Pop. 691,700. 2. (So called from the Rom. *Pons Vetus*.) (Cap. of the above prov., 30 m. S. of Santiago. It has a cathedral, and trades in hats, cloth, grain, and sardines. There is a naval wireless telegraphic station. Pop. 29,500.

Pontiac (c. 1712-69), chief of the Ottawa Indians. He engineered a vast conspiracy in 1763 against the Eng. With the help of the Wyandot, Potawatomi, Ojibwa, and other tribes, he captured many forts, arranged successful ambuscades, and slew and captured many Eng. He besieged Detroit and Fort Pitt in vain, however, and in 1766 yielded to his enemies. Three years later he was assassinated by one of his own race while living in the Mississippi valley. P. possessed a faculty for organisation rare among his race. He and his friends had been allies of the Fr. in the long struggle between them and the Brit. for possession of Canada and the W. After the Fr. were beaten P. retained all his hostility to the Brit. His plan was nothing less than to drive them all E. of the Alleghenies. See E. Parkman, *The Conspiracy of Pontiac*, 1896, and H. H. Parkman, *Pontiac and the Indian Uprising*.

Pontiac: 1. Manufacturing cit., which also trades in agric. produce, 26 m. N.W. of Detroit, in Oakland co., Michigan, U.S.A. There are manufs. of automobile parts, bricks, radio sets, varnish, and paint. It is a holiday resort and has gravel pits. Pop. 66,600. 2. Coal-mining and railway centre in the heart of Livingston co., Illinois, U.S.A. Pop. 8000.

Pontian, Saint (d. c. 236), succeeded St. Urban I. as pope about 226. Five years later he was exiled to Sardinia by the emperor Maximus, and is said to have d. from ill treatment.

Pontianak, port on the Kapuas, on the S.W. coast of Dutch Borneo. It exports diamonds. Pop. 18,000.

Pontifex (Lat. *pons*, bridge, *facine*, to make; Eng. *Pontiff*), member of the chief sacred college of Rome, at whose head was the *pontifex maximus* (high priest). Up to the days of Sulla, when the number was raised to fifteen, the college had nine members (four patrician and

five plebeian), elected at first by co-optation, but after 103 B.C. by the *comitia tributa*, under the presidency of a pontiff. The college supervised religion, and was the last court of appeal when any religious dispute arose. It further possessed considerable political power through its control of the calendar and its power to intercalate days and regulate festivals. The *pontifex maximus* chose the flamines, vestals, and the *rex sacrorum*, and was in fact the pope of anct. Rome. From Augustus onward the Rom. emperor assumed his functions and title. The title was assumed by the popes when Christianity became estab.

Pontifical, liturgical book for the use of the bishops in the Rom. Catholic Church, containing prayers and rubrics for episcopal ceremonies other than the Mass. Books of this nature are found as early as the eighth century. The *Pontificale Romanum* appeared in 1485. See P. de Puniet, *Pontifical Roman*, 1931.

Pontine Marshes (Lat. *Pometinæ Paludes*) stretch from Velletri to Terracina on the coast in the Rom. Campagna, Italy. As early as 312 B.C. Appius Claudius tried to drain this dist., and further efforts were made by Augustus, Trajan, and many of the popes. The Fascist Gov., however, made more successful efforts at its drainage, the reclaimed area constituting the new prov. of Littoria. It is crossed by the great Appian Way, and was formerly dangerous to travellers on account of poisonous exhalations.

Pontius Gavius, general of the Samnites, who subjected the Rom. consuls Postumius and Veturius and their army to the memorable disgrace in the Caudine Forks (321 B.C.).

Pontius, Paul (b. 1596 or 1603), Flem. engraver, famous for his reproductions of the pictures of Rubens and the portraits of Van Dyck.

Pontius Pilate, Rom. procurator of Judæa. He belonged to the equestrian order and was appointed to his office by Tiberius in A.D. 26. During his rule Christ was crucified. Recalled in A.D. 36, after endless quarrels with the Jews, he is reported by Eusebius to have taken his own life at Vienne in Gaul, the scene of his banishment. The Coptic tradition says he was martyred as a Christian and he is claimed as a saint by the Ethiopian Church. Authorities for P. P.'s life are the N.T., Eusebius, Josephus, and Philo. See M. Radin, *The Trial of Jesus of Nazareth*, 1931; A. V. Juckin, *Jesus and Pilate*, 1941; K. L. Schmidt, *Der Todesprozess des Messias Jesus*, 1945; and C. M. Franzén, *The Memoirs of Pontius Pilate* (novel), 1945.

Pontius Pilate's Bodyguard, see ROYAL SCORNS.

Pontivy (formerly Napoléonville), tn. 29 m. N.E. of Borient, in the dept. of Morbihan, France. There are linen and paper manufs. The tn. was damaged in the Second World War. Pop. 10,900.

Pontoise, tn. of Seine-et-Oise, France, on the junction of the Viosne and the Oise, 22 m. N. of Versailles. Its manufs.

include chemicals, and there are flour-mills and shipyards. Pop. 11,000.

Pontoon signifies a floating dock or, more strictly, a floating bridge. The floating bridge has been used for military purposes from very anct. times, early examples being that thrown across the Bosphorus by Darius, and the one formed by Xerxes over the Hellespont, of which Herodotus has given a full description. In more recent times they were much used by Marlborough in his campaigns. Military Ps. in the twentieth century were generally constructed to float on cylindrical floats of tin or copper. The Gers. used rubber Ps. during the Fr. 1940 campaigns in the Second World War. Later, Ps. were often replaced by the Bailey bridge. For a description of floating docks, see DOCK, Floating Docks.

Pontoon (ward game), see VINGT-ET-UN.

Pontoppidan, Erik (1698-1764), Dan. historian and topographer. He wrote *Annales ecclesiæ daniæ* (1741-47), a *Danske Atlas*, containing an elaborate description of Denmark, and a hist. of the ant. places abroad (1740).

Pontoppidan, Henrik (1857-1943), Dan. novelist and poet, b. at Fredericia; he studied mathematics and physics at Copenhagen Univ. In his three novels, *Muld* (1891); *Det forfættede Land* (The Promised Land, 1892); and *Dømnens Dag* (1895), which together give the life-hist. of a minister who weds a peasant wife, he draws with remarkable force an intimate and sympathetic picture of country folk, though his work is coloured by extreme pessimism and bitterness. Both Georg Brandes and Goldschmidt had an important influence in his work. His early realistic tales of Dan. peasant life have probably never been equalled. His poetry is pessimistic and sceptical but it harmonised with the spirit of Denmark at the time he wrote it. In 1917 he and Gjerulup gained the Nobel prize for literature. See lives by V. Andersen, 1917, and K. Thomsen, 1930.

Pontormo, Jacopo da (1494-1557), It. painter, b. at Pontormo. He belonged to the Florentine school, and at different times fell under the influence of Andrea del Sarto, Albrecht Dürer, and Michelangelo. His two Medici portraits are good.

Pontremoli, tn. and the seat of a bishop, on the Magra, 49 m. S.S.W. of Parma in Tuscany, Italy. Pop. 16,200.

Pontresina, vil. much frequented by tourists, 3 m. E. of St. Moritz, in the canton of Grisons, the Upper Engadine, Switzerland. Pop. about 800.

Pontus, most N.E. dist. of Asia Minor, along the coast of the Euxine. The dist. first acquired a political importance through the foundation of a new kingdom, about the beginning of the fourth century B.C., by Ariobarzanes I. This kingdom reached its greatest height under Mithridates VI., who for many years carried on war with the Romans. In A.D. 62 the country was constituted by Nero a Rom. prov.

Pontus Euxinus, see BLACK SEA.

Pontypool, urban dist. and mkt. tn. with manufs. of iron ware, tin-plate,

nylon yarn, soft toys, and glass. 8 m N of Newport in Monmouthshire, England. The first tin plate to be made in Britain was produced here in 1670. It is on the border of the S Wales coalfield. Pop. 42,300.

Pontypridd, urb. dist. and mkt. tn. of Glamorganshire, Wales, situated at the junction of the R. Taff and Rhondda. It is an important centre for the mthab. of the tv. Rhondda valleys, the Taff Valley, and a considerable surrounding area. The tn. is industrial in character but possesses pleasing residential areas and the spacious and well-known Ynysangharad Park. There are chain and cable works and iron and brass foundries. Lying 2 m from the centre is the Ffronist Trading Estate comprising seventy factories laid out on modern lines. The 'Old Bridge', from which the tn. takes its name, was erected in 1755 and is still one of the largest single span bridges in the Brit. Isles. The council owns transport (including trolley vehicles), refuse destruction, open air swimming bath, parks, libraries and public offices and controls a crematorium, which was one of the first to be provided in Wales. Pop. 39,400.

Pony, see HORSE.

Ponza (anc. *Pontia*), chief of a small group of is. in the Mediterranean, 70 m W of Naples, Italy. Pop. 41,000.

Pood, or **Pud** (from Low Ger. *pund* pound), Russian weight equivalent to 40 Russian lb. and 36 lb. avoirdupois.



T. Fall

POODLE

Poodle, breed of dogs which first appeared in the seventeenth century. P's are usually jet black like the Pomeranian or pure white like the Ger., but modern breeders have introduced other shades. Their coat is a mass either of short curls or long ropey ringlets. The eyes are dark, bright, small and full of intelligence; the muzzle is square, long and not snipy; the skull is broad and high with a well-developed brow. The ears are low set, long and close to the cheek, and the body is

lifted well above the ground. The weight varies from 20 to 60 lb. The P. is remarkably sagacious. It is frequently clipped or trimmed and its flesh is often left bare even in winter except for a few fringes and tufts on the legs, tail and shoulders.

Pool, see under BILLIARDS.

Pool, or **Pole**, **Matthew** (1624-79), Eng. biblical commentator, attended Emmanuel College, Cambridge and in 1651 accepted the living of St. Michael le Quenue, London. In 1662 he was ejected from this cure through his inability to subscribe to the Act of Uniformity. His *Synopsis criticorum biblicorum* (5 vols., 1669-76) is a learned digest of all the exegetical works he had read.

Pools, seaport and port constituency with outlet to the W. of Bournemouth in Dorsetshire, England. There is trade in pottery, clay, tiles, bricks, sanitary pottery and chemical rope and sail cloth and there is engineering, boat building and repairing. P. is a holiday resort and P. Head, a stretch of water 7 m. long containing Bournemouth or Bournemouth Is. is a favourite yachting centre. Pop. 80,600.

Pools Dinding, see under BINDINGS.

Pools, **Football**, betting on football results by postal orders with pools promoters. In 1931 the estimated turnover from this form of betting was £20,000,000. In 1935 the taxation of pools produced £12,200,000, which as the rate of duty was 20 per cent revealed a turnover of about £11,200,000. The big football pool promoters in 1949 employed 23,531 persons comprising 2453 men and 21,078 women.

Poonah, or **Puna**, dist. and city in Bombay, India. The dist. is diversified with highlands belonging to the W. Ghats in the W. whilst level stretches cover the l. Outcrops, pulse, wheat, rice, fruit and millet are cultivated and blankets, silk and cotton are manufactured. The tn. is 341 sq. m. and the pop. 1,100. The city lies at the confluence of the Mula and Mutha 63 m W. S. W. of Ahmednagar and 119 m S. E. of Mumbai. Before the transfer of power in 1947 it was the chief military station in the Deccan and in the hot season the centre of government in the Bombay presidency. An important intellectual centre it depends for its prosperity on dairies, in cotton flour and paper mills. There is a large ivory carving industry and silks and h. w. l. are made. In 1925 a meteorological observatory was opened here. P. has, of course, a large vil. population and is the headquarters of the P. S. S. Sudan Society which trains women for independent and to undertake teaching and medical work among women of India. It has suffered greatly from plague epidemics. P. was once the cap. of the Marhattas and was taken by Britain in 1619. Pop. 2,80,000.

Poon Wood, name given to the wood of *Calophyllum inophyllum* and other species. It is used for masts and spars.

Poopo, lake of Bolivia connected with Lake Titicaca by the Desaguadero R. It is situated 185 m S. E. of Lake Titicaca.

but is 500 ft. lower. Its normal area is 400 sq. m. Old cartographers call it Pampa Aullagas.

Poor Clares, see CLARE, St.

Poor Laws: *Historical Sketch.*—The hist. of the Eng. poor law system is generally taken as commencing with the passing of the Act of 1601 (cited as the 43 Eliz. c. 2). This important statute estab. the fundamental principle of a compulsory assessment for the relief of the poor on the occupier of land or house property. But long before the end of the sixteenth century 'a persuasion seems to have been gaining ground that severe punishments alone would not prove effectual, and that something else was necessary for putting down vagabondage and mendicancy, with their auxiliary train of evils' (Nicholl's *History of the Poor Law*, 1858). By an Act of 1536 the head officers of tns. were directed to succour and charitably relieve the impotent poor, and also to set and keep vagabonds and beggars at continual labour. The money required for the purpose of this Act was to be derived from voluntary contributions collected partly by the head officers of corporate tns. and the churchwardens of par., and partly in the churches, and on various occasions where the clergy had opportunities for exhorting the people to charity. This voluntary system was continued by an Act of 1552, which provided that a register of the poor should be kept, and parishioners 'gently exhorted and admonished' to contribute, according to their means, for similar objects. The system was evidently not crowned with success, for by an Act of 1563 justices were empowered to use compulsion towards persons obstinately refusing to contribute; and by an Act of 1597 nearly all the means were provided, short of an absolute and regular assessment of property, for effectually relieving the destitute poor, and for giving employment to such of them as were able-bodied. The Act of Elizabeth directed the overseers of every par. to set people to work who had 'no ordinary trade to get their living by,' and for that purpose empowered them to raise by taxation of every inhabitant, person, and occupier of lands, houses, tithes, mines, etc., such sum as they required for providing a sufficient stock of flax, wool, or other material on which to set the poor to work. They were also empowered to raise sums for the relief of lame, blind, old, and impotent persons and for putting out children as apprentices. Churchwardens and overseers were authorised to build poorhouses at the expense of the par. (for the impotent poor only), and justices were given power 'to assess all persons of sufficient ability for the relief and maintenance of their children, grandchildren, and parents.' This was the state of the P. L. right down to 1832, when, in consequence of the long-matured abuses of administration, a royal commission was appointed to inquire into the evils alleged and to suggest remedies. The result was the Poor Law Amendment Act of 1834, in which the prin. recommendations of the

commission were embodied. This important Act made no change in the law respecting the rateability of property or the mode of collecting the rate, its provisions in this connection relating exclusively to a more equitable distribution of the rate when collected. The prin. administrative changes effected by the Act were (a) the appointment of a central supervisory board (subsequently the Local Gov. Board and now the Ministry of Health) having control over all local bodies entrusted with the management of poor law funds, and power to order workhouses to be built with the consent of a majority of the guardians. (b) The union of sev. par. for the more economical administration of poor relief. But each par. in the union was to defray the actual charge in respect of its own poor. Each union was to be managed by boards of guardians annually elected by the par. rate-payers. (c) The discontinuance of the system of paying wages out of poor-rates, and the prohibition, generally, of relief to able-bodied paupers and their families, otherwise than within the walls of a workhouse. To all intents and purposes the poor law system in principle remained stereotyped from 1834 until 1948, the changes effected by the Act of 1948 relating mainly to administration.

The Act of 1834 was essentially an instrument for disciplining a people as yet not habituated to the wage-earning urbanised industrialism introduced by the Industrial Revolution. During most of the Victorian era the relief of distress was left to private thrift and charity, with the threat of a 'well-regulated workhouse' held in reserve. The poor law was the only public relief service for every kind of distress, accentuating deference rather than constructive assistance. Wherever possible the pauper was offered 'the house' or nothing. Outdoor relief, when granted, was almost always inadequate, and, for the able-bodied, conditional on labour tests in which tramps, loafers, and genuine unemployed were grouped together on practically useless work. The Act gave a sharp spur to working-class thrift, above all to the friendly societies built up mainly by skilled workers who could afford to save. Out of the old local network of small benefit clubs and fraternities, disorganised by the Industrial Revolution, there gradually arose large-scale centralised, affiliated, or collecting societies, run by agents for, rather than by, the workers. In burial insurance these in turn were increasingly outstripped by commercial companies formed by business men for the sake of gain. The National Insurance Act of 1911, by allowing these companies to administer cash benefits under the National Insurance scheme, ensured their eventual control of this type of working-class thrift, and greatly accelerated the decline of the 'fraternal' spirit in bodies already ceasing to be in any real sense either 'societies' or 'friendly.' But by the beginning of the present century public opinion was coming to realise that pauperism was the symptom of a social disease which should be prevented

by social action. The first step towards this was the creation of a system of public education, with its own medical service and feeding schemes, the rise of municipal medical services increasingly detached from the poor law, the development of an infant welfare movement, and the recommendation of a royal commission that the mentally defective should be entirely removed from the poor law.

The majority report of the royal commission of 1908 tried to remove the stigma attaching to poverty by the recommendation that the div. of the Local Gov. Board which dealt with poor relief should be known as the 'Public Assistance Division.' It would abolish the poor law guardian by recommending the formation of a new local authority composed of nominees of co. and co. bor. councils and persons experienced in poor law work, to be called the Public Assistance Authority, for central administration and control within an enlarged area (*cf.* Parish), together with local committees for dealing with applications, investigating and supervising cases, and undertaking such other duties as might be delegated by the Public Assistance Authority. In so far as it advised the continuation of the workhouse system, or, rather, the grant of indoor relief, the commission recommended it only in those cases in which constant supervision satisfied the authorities that 'institutional treatment was productive of the result desired. For the able-bodied, the commission recommended a national system of labour exchanges. Correlatively with these recommendations, the report deprecated the system of out-door relief, or 'home' as opposed to 'institutional' assistance, and advised that out-relief should be given only after thorough inquiry (except in cases of sudden and urgent necessity). In regard to children, the report advocated the extension of the boarding-out system, but insisted on the strictest inquiry into the character of the foster parents and the suitability of the home.

The minority report was far more revolutionary. It recommended the repeal of all Acts relating exclusively to poor law relief, the abolition of boards of guardians, and the transfer of their powers to the co. and co. bor. councils; the duty of organising the national labour market, so as to prevent or minimise unemployment, to be placed upon a responsible minister, to be designated the minister for labour; the appointment of a Ministry of Labour; and the repeal of the Unemployed Act and the abolition of distress committees. The efforts of the royal commission of 1908 proved more or less abortive, for some of the majority members favoured organised charity of an impracticable nature, while the minority members recommended the abolition of the poor law and the exercise of its functions by other local authorities. The Gov. rejected the fundamental proposal to alter the whole basis of relief and the report was shelved. Thus the position remained until the First World War when by reason of

the creation of new social services, the overlapping of functions became more evident, and, moreover, the union had ceased to be an efficient unit of administration. An Act of 1927 did not improve matters, for it did no more than state the existing law, and that law was to be found scattered in some ninety-nine different Acts of Parliament. Then, at length the Local Government Act, 1929, was passed, which in the sections pertaining to the poor law transferred as from April 1, 1930, the poor law functions to co. and co. bors., and abolished the boards of guardians. But this Act left the principles of the poor law unchanged, and the close control of the Ministry of Health over the guardians through inspectors and auditors, etc., was still exercisable over the new authority. Then came the Poor Law Act, 1930, which was a consolidation measure and contained all the statute law on the subject. The introduction, however, in 1908, of the state 'means test' pensions for persons aged seventy or over implied the first major breach with the poor law; and it was followed by whole or partial removal from the poor law of one sector after another of distress, to be dealt with by more specialised *ad hoc* public agencies. From 1911 the National Health Insurance scheme provided cash benefits and treatment by general practitioners for the worker during his incapacity; from 1926 contributory pensions were paid to widows and orphans and, from 1928, to persons aged 65-70; in 1920 the state means test pension was extended to blind persons over fifty (reduced to forty in 1938).

Authorities and Officers for the Administration of the Poor Laws prior to 1948.—The entire management of poor relief was placed in the control of the Ministry of Health through the agency of the co. councils and the co. bor. councils, under the Local Government Board Act of 1929 (*see* LOCAL GOVERNMENT). The guardians were superseded by the Ministry of Health as a result of the recommendations of the Poor Law Commission of 1908, and the Metropolitan Asylums Board similarly disappeared. The burden of poor relief was thus spread over wider areas. A scheme of administration had to be submitted by each council for the approval of the minister of health, and a Public Assistance Committee had to be formed of which at least two-thirds of the members were councillors, together with some women members.

Poor Law Relief under the old Poor Law.—The general duty of giving relief extended to the following cases: setting to work the able-bodied unemployed; relieving those who were unable to work; and setting to work or apprenticing children whose parents could not maintain them. Relief was of two kinds, out-door relief and institutional relief (as to the latter, it may be noted that the only statutory word was 'workhouse' and the general rules for administering workhouses remained in essentials unchanged). The Act of 1930 authorised out-door or any other kind of relief to be given to

those who were unable to work and under the Relief Regulation Order the relief might be given unconditionally in the case of urgent necessity (as in the case of sickness, mental infirmity etc. whether arising out of old age or not). Further, a court of summary jurisdiction might order such relief to be given in these cases whether in kind, money, or medical relief. As regards the able bodied, the above order provided that men must be set to work or given training and instruction and at least one half of the relief must be otherwise than in money and relief was granted only on the orders of the council or the appropriate committee. Actually the relief was given by the relieving officer whose precise duties will be found described in Article 167 of the Public Assistance Order. A justice of the peace having jurisdiction might order relief in cases of sudden and

such as voluntary institutions or public health hospitals (as to former miscellaneous forms of relief see under BURIAL ACTS, VAGRANTS). It may be noted that there were special provisions relating to casuals in London as under the old law, because the care of casuals was one of the functions vested in the Metropolitan Asylums Board at the charge of the whole of London.

Cost of Poor Relief—The cost of poor relief under the old poor law was drawn from the 'general dist. rate of the co. or co. bor. area under the Rating and Valuation Act of 1925' while grants from exchequer contribution accounts were paid in to the union common funds with such sums as were recovered from paupers or their relatives. The cost of poor relief in England and Wales during the year 1913 and subsequent years is shown in the following table.

Year	Persons Relieved	Total Expenditure	Expenditure from Rates
1913	794,227	£ 14,115,405	£ 11,907,713
1914	1,593,036	42,511,265	35,130,016
1915	1,407,715	41,458,311	36,948,651
1916	1,211,672	41,150,411	35,118,244
1917	1,222,033	43,105,215	37,140,111
1918	627,000	41,116,275	32,500,347
1919	570,295	37,106,122	31,007,224

dangerous illness and even for persons not settled or ordinarily resident in the co. or bor. where the case was one of urgent necessity. As regards children it is to be observed that the apprenticeship system had virtually disappeared in reason of the difficulty of apprenticing a child to a skilled trade without a premium. Children were relieved either by giving relief to their parents or through their adoption by the poor law authority with the consequence that the council had the powers of parental control. The out door relief of able bodied unemployed was taken over by the Public Assistance Board set up under the Unemployment Act of 1931 (Part II) thus relieving poor law authorities of a large body of dependants. Unemployment insurance was thereby finally restricted to short term unemployment.

Institutional Relief under the old Poor Law—The minister could not compel a council to provide a workhouse but if he were requested to do so by the council itself he might order the provision of such accommodation or the adaptation of an existing building to such purpose at a cost not exceeding £1000. The later poor law administration condemned the mixed workhouse and actually three different types were set up: hospitals for the sick, children's homes, and institutions for the aged and unemployed—and all these were in separate buildings or separate blocks of the same building. The poor law authority had power to send two classes, namely the blind or deaf and dumb and the insane, to special estates

The number of persons relieved in 1944, 1913, and 1946 was 40,700, 532,100 and 4,400 respectively.

Poor Law Abolition—The National Assistance Act 1948—The Second World War strengthened the tendency to place all major security burdens on the state whose outdoor relief agency remained the Assistance Board, was entrusted with the administration of new state financed schemes to relieve war distress, to pay supplementary means test pensions to old age pensioners and temporary war injury allowances for civilians. The board was then growing into a national omnibus agency for outdoor relief in cash and the gap between state and local relief was widened in 1941 by the substitution of a much less stringent family means test for the former Unemployment Assistance Board (UAB) house hold means test. Shorn of many of its functions with an increasing transfer of its institutions and constructive services to other authorities the poor law in 1941 became a local residual relief service supplementing the new public services and filling in the gaps left by them. Its chief remaining functions were domiciliary relief of widows deserted wives and old persons not entitled to pensions, institutional relief of the chronic sick and various 'social problem' groups, and medical relief of destitute persons not entitled to National Health Insurance panel treatment.

The creation of these new income maintenance agencies profoundly modified British social life and thought. Yet

the new services were still relatively experimental; their growth was piecemeal and ill-planned and had not yet reached the final form required by modern industrial society. Britain's income-maintenance services, with the important exceptions of unemployment services and possibly of old age pensions, were backward compared with those of many other countries.

The Beveridge Report (1942) recommended that the poor law should be abolished. This recommendation was accomplished in far-reaching reforms of the National Assistance Act (1948) (*q.v.*), which concluded an epoch in Eng. hist. For most of the essentials of what became the poor law existed long before the Tudors subjected virtually the whole life of the labouring classes to a system of paternal state regulations by means of a comprehensive code contained in the poor law and the statute of artificers. In all epochs before the present century the poor law was so built into the social fabric of England that the hist. of the changing fortunes of the common people can only be imperfectly understood if the poor law is omitted from the narrative. The introduction in 1908 of non-contributory old-age pensions and in 1935 of state unemployment relief, managed by the U.A.B., made the need to nationalise what remained of local public assistance in the long run inevitable. Yet the idea was not new, for the royal commission on the poor law of 1832-33 considered seriously the creation of a national assistance service; but it required more than a century of economic and political advance to make this characteristically Benthamite reform socially and administratively practicable.

The National Assistance Act disposed of the last remnants of the old poor law system as described in the foregoing pages. Under it responsibility for giving assistance to those in financial need passed from local authorities to the state. This reform filled the last gap in the comprehensive scheme of social security (see SOCIAL INSURANCE). The Act substituted the National Assistance Board as the sole body charged with the duty of administering a single comprehensive service replacing outdoor relief, unemployment assistance, supplementary pensions, and assistance for the blind and those undergoing treatment for tuberculosis. But the duty was laid on the local authority to provide 'residential accommodation' for persons who, by reason of age, infirmity, or other circumstances, were in need of care and attention not otherwise available to them; and the local authorities were required to submit their schemes for caring for old and infirm people to the minister of health for inspection.

Regarded as a whole, the new reforms represented a humane and sensible settlement of assistance as a national duty and fixed a sound foundation for the orderly development of the new welfare services. It made it more than ever necessary for the Assistance Board to decentralise its

work and to train its officers in the spirit of modern social service. The poor law relieving officer as such was abolished but his function remained. The board's officers became the general practitioners of public assistance. They were always to be at hand to give emergency relief at any moment. The work of the board under this new dispensation was far removed from the mere relief of 'distress,' as that term was interpreted by the poor law at the beginning of the twentieth century. See J. F. Archbold, *The Poor Law* (15th ed.), 1898; W. C. Glen, *Poor Law Orders* (11th ed.), 1898. See also *Poor Law Returns of the Ministry of Health*; Beatrice and Sidney Webb, *Local Government: Poor Law Officers' Journal*, 1930; G. Druce, *Public Assistance*, 1930; J. J. Clarke, *Public Administration, including the Poor Laws*, 1934; W. I. Jennings, *Poor Law Code*, 1937; P. Lesly (ed.), *Public Relations in Action: Case Studies*, 1947; and W. A. Robson, *Public Administration To-day*, 1948.

Poor Man's Weather-glass, see ANAGALLIS, PIMPERNEL.

Poor Persons' Legal Aid. *Poor Prisoners' Defence.*—The grant of free legal aid for poor prisoners is provided for by the Poor Prisoners' Defence Act, 1930, which came into force in 1931. The analogous Act of 1903 was the first piece of legislation providing free legal aid for poor persons, but it restricted the grant of aid to a person charged with a crime for which he could be tried only at the assizes or quarter sessions and, moreover, it rested with the magistrate to decide whether it was desirable to grant free legal aid, and even if granted it was not available until after the accused had been committed for trial. The Act of 1930, repealing the Act of 1903, applies both to indictable offences and to those triable summarily by a magistrate, and official lists are kept of solicitors and barristers willing to undertake the defence of poor prisoners and whose fees are paid out of local funds. In the case of an indictable offence the accused may have free legal aid if: (1) on commitment for trial, or the judge of the trial court grant a defence certificate. If the person's means are insufficient, such certificate may be granted in cases where desirable, and must be granted in the case of a murder charge. In courts of summary jurisdiction, assuming insufficient means, a defence certificate may be granted if it is considered desirable to do so by reason of the gravity of the charge or of exceptional circumstances. The Act is only intended to help poor persons to prepare and conduct a defence, where they have any defence at all, so that they may be in the same position as those who can afford to pay for it; it is not intended to provide professional assistance for the purpose only of making a plea in mitigation of sentence on a guilty person.

Civil Cases.—Under a system for giving legal aid to poor persons in civil proceedings administered by the Law Society there are poor persons committees established throughout England and Wales to which

any one requiring this form of aid may apply for a poor persons' certificate and, if this be granted, a solicitor and counsel will be allotted to act without remuneration. The certificate can be granted if the applicant is not worth £50 (excluding wearing apparel and tools of his trade) and his usual income is not over £2 a week. In special circumstances these limits may be £100 and £4 respectively, and a special relaxation of the upper limits may be granted when the applicant was, at the time of application, serving in the forces. The committee may require the applicant to deposit a sum not exceeding £5 to cover the out-of-pocket expenses of the solicitor. Divorce proceedings under the above system may be commenced at the divorce registry in London or in any district registry in the provs. authorised for the purpose, and the trial may be in London or at the assizes at one of the many tns. at which divorce business may now be taken under the rules of the supreme court.

Legal Aid and Advice Act (1949).—This Act provides for a considerable expansion of the present scheme of legal advice but is not yet (1950) in operation. The new Act provides for (a) the provision of oral legal advice, and (b) legal aid in civil and criminal proceedings. Eligibility for aid will depend on the financial circumstances of the individual; generally speaking, any persons whose gross income does not exceed £700 to £750 will be within the scheme.

Scotland.—In every sheriffdom in Scotland there are solicitors for the poor, and in the court of sessions there are counsel and solicitors for the poor, all of whom act gratuitously. No court dues are payable in the first instance. Any class of litigation may be undertaken for poor persons. The means that preclude a person from the benefit of the Poors' Roll are not fixed, and each application depends on its own circumstances. The Legal Aid and Solicitors (Scotland) Act of 1949 follows the general lines of the Legal Aid and Advice Act for England and Wales, but with important differences.

Popayán, episcopal see, city, and cap. of the dept. of Cauca, Colombia, S. America, at the foot of the volcano of Puracé, 235 m. S.W. of Bogotá. It stands at an altitude of 5700 ft., and has a cathedral and univ. and beautiful old monasteries and cloisters of classic Sp. architecture. The carved pulpit of S. Francisco and the jewelled monstrances of that church and of San Agustín are noteworthy. The city was founded in 1536 and was the home of the poet Guillermo Valencia. Gold, silver, platinum, and copper are found in the neighbourhood. The chief industry is blanket-making. Pop. 39,000.

Pope, Alexander (1688–1744). Eng. poet and satirist, b. in the city of London, the son of a rich Rom. Catholic linen-draper. Because of his religious faith, he was educated privately. A severe illness at the age of twelve affected his health for the rest of his life and deformed his figure, about which disfigurement he was always very sensitive. He was a singularly

precocious lad, and fond of books from a very early age. While at school he was addicted to composition, and imitated his favourite authors. The exact date when he wrote his *Pastorals* cannot be stated, but they were pub. in Tonson's *Miscellany* in 1709. These poems attracted a good deal of attention, as did the anonymous *Essay on Criticism* (1711). Addison praised the *Essay* in the *Spectator*, and when Steele introduced to him the young author, he gave P. the benefit of his patronage. *The Rape of the Lock* (1712), an amusing mock-heroic poem, brought P. into further prominence. The intimacy between P. and Addison did not long endure. There were faults on both sides. Addison's patronising attitude would have irritated a man more patient than P., but P.'s sensibility was abnormal, and the breach is said to have arisen when Addison declared that Tickell's trans. of Homer was the best. P. retaliated with the famous *Atticus* passage, in which he ridiculed Addison unmercifully. He became a member of the Scriblerus Club, and made friends with Swift, Gay, Congreve, and their set. In 1715 he issued the first instalment of his trans. of the *Iliad*, the last vol. of which did not appear until five years later. He leased a villa at Twickenham in 1719, and there made acquaintance with Lady Mary Wortley Montagu, with whom he afterwards had a bitter quarrel, and contracted a more lasting intimacy with Teresa and Martha Blount, to the latter of whom he was devoted. He ed. the poems of Parnell (1722) and later the works of Shakespeare (1725), which, however, was practically a failure. After this, with the assistance of Wm. Broome and Elijah Fenton, he prepared a trans. of the *Odyssey* (1725–26), from which he derived a handsome profit. P., in 1725, conceived the idea of writing a satire upon contemporary men of letters, and three years later this appeared anonymously under the title of *The Dunciad*, the archduke being Lewis Theobald, who had written a scathing attack on P.'s ed. of Shakespeare. The book created a tremendous sensation, and many retorts were made upon the author, whose veil of anonymity was too thin to disguise his identity. The satire was reissued, with additions, in the following year, but the authorship was not avowed until 1735. Of its brilliance there is no question, but it did not fulfil P.'s purpose of extinguishing the Grub Street writers, rather serving to bring them into prominence for all time, since the memory of many to whom allusion is made in the lampoon, for such it is in reality, is still kept alive by the vehicle intended for their destruction. In 1742 P. brought out a revised *Dunciad*, in which he dethroned Theobald and set up in his place the veteran actor and dramatist Colley Cibber. He pub. the *Essay on Man* (1732–34) and the *Moral Essays*, which were but a part of a contemplated series of poems, suggested by Bolingbroke, in which human nature was to be exhaustively and systematically surveyed. Among his best work was his trans. of Horace, begun in 1733. As a

man P. suffered much from excessive sensibility, and it was this unfortunate weakness that caused him to quarrel so frequently and so vigorously. His devotion to his mother is the most pleasing, as it is the most natural trait in his character. The illness which warped his body seems also to have affected his mind, and to have left in him a certain streak of dishonesty, which manifested itself again and again, most noticeably in the case of the pub. of his letters, which he printed not as they were written, but altered for his own ends. Twentieth-century biographers, however, have stressed the more pleasant side of P.'s character, and the more traditional portrait of him, drawn by the Romantics, has been somewhat modified. As a poet he occupies a high place in Eng. literature. The smoothness of his line is remarkable throughout his work, and to secure this he laboured unremittingly, though his writings lack any emotional quality and his finest passages show him as a master of rhetoric rather than as an interpreter of the spiritual. If in the Horatian satires and in the fourth book of *The Dunciad* he is, generally speaking, at his best, he is brilliant in such earlier pieces as Epistle V. (*Moral Essays*) addressed to Addison. The standard ed. of his works and correspondence is that prepared by Elwin and Courthope (1871-89), and there is an ed. of his collected poems in Everyman's Library. See lives by S. Johnson, 1781; G. Paston, 1909; E. Sitwell, 1930; G. Sherburn, 1931; N. Ault, 1919; also monograph by Sir L. Stephen, 1878.

Pope (fish), see **TRUFFLE**.

Poperinghe, city in W. Flanders, 6 m. W. of Ypres. It has textile manuf., and grows hops, of which it is the most important market in Belgium. It was the railroad for the Ypres sector during the First World War, and therefore well known to hundreds of thousands of Brit. soldiers who fought in that sector. It was at P. that part of the Brit. 1st Corps arrived in Oct. 1914 and participated in the operations which developed into the first battle of Ypres. Pop. 12,400. See also **Tou H.**

Popinjay (O.F. *papayn*), obsolete synonym for 'parrot,' for which it is still used in heraldry. The word is used to-day in its transferred sense of 'coxcomb.'

Poplar, or **Populus**, genus of hardy deciduous trees (family Salicaceae), with broad leaves on long stalks, and drooping catkins with jagged scales. The Brit. species are: *P. alba*, the white P. or Abele, a large tree, with smooth grey bark and lobed leaves, cottony and snowy white beneath; *P. tremula*, the aspen, which has nearly round leaves, glabrous on both surfaces; *P. canescens*, the grey P., is probably a hybrid between them. *P. nigra*, the black P., and *P. fastigiata*, the tall handsome Lombardy P., are not indigenous, though common features of Brit. scenery.

Poplar, metropolitan bor. and bor. constituency, with an area of 2328 ac., in the E. end of London. Pop. 73,000.

Poplar Bluff, co. seat of Butler co.,

near Black R., in S. Missouri, U.S.A. Pop. 7500.

Poplar Marshes, see **DOGS, ISLE OF**.

Poplin (Fr. *popeline*), dress fabric, used also for upholstery, with a warp of silk and a weft of worsted which give a corded structure. Huguenot refugees introduced its manuf. into England, but it is now chiefly made in Dublin.

Popocatepetl (Aztec, 'smoking mountain'), dormant volcano, 45 m. S.E. of Mexico city, Mexico. It rises to a height of 17,520 ft., and its summit is covered with snow. The last serious eruption was in 1548, but minor ones occurred as late as 1802. Its crater (diameter 2700 ft.), contains exceptionally pure sulphur. Diego Cortez scaled P. in 1522, being the first ever to do so.

Poppet Valve, see under **VALVES, MECHANICAL**.

Poppo, Saint (978-1018) Flem. saint and abbot. He became a Benedictine at St. Thierry, Rheims, in 1006, and went to St. Vannes in 1008 to help in the revival of monastic discipline there. As provost of St. Vast, Arras, he became the friend and adviser of emperor St. Henry, who made him abbot of Stavelot-Malmédy in 1021. P.'s influence led to a revival in monastic fervour and discipline throughout Flanders; he is one of the greatest monastic figures of his century. See P., Ladewig. *Poppo und die Klosterreform*, 1883.

Poppy, or **Papaver**, genus of annual plants with white milky juice and showy red, pink, white, and yellow flowers. From the common P. (*P. rhoeas*) sev. fine garden plants have been derived. The opium P. (*P. somniferum*) bears large white flowers. Opium is derived from its unripe capsules, but the ripened seeds yield a wholesome oil, the residue being made into oil-cake for cattle feeding.

Popski's Private Army, independent unit of the Brit. Army formed in Oct. 1942 by Vladimir Peniakoff ('Popski'), D.S.O., M.C., who was born in Belgium of Russian parents, educated in England, fought in the Fr. Army in the First World War and settled in Egypt in 1924. In 1910 P. joined the Long Range Desert Group (q.v.) and served with it and the Libyan Arab Force (Senussi Regiment) for two years. The role of P. P. A. was reconnaissance and raiding behind the Ger. lines; it pioneered the El Hama approach along which the New Zealanders and Gurkhas made their decisive attack in March 1941. P. P. A. reached its greatest strength (120 men) when co-operating with partisans N. of the It. front. It penetrated into Austria behind Vietinghoff's retreating army group and was the first Eighth Army unit to contact the Russians in Styria. See Lt.-Col. Peniakoff, *Private Army*, 1950.

Popular Front, suggestion for political collaboration of Communists, Socialists, and other left-wing parties against Fascism, advanced by the Communist International in 1935. The P. F. platform provided for common resistance to Fascism and various social reforms on a democratic basis, but no adoption of

Socialism. P. F. govs. were estab. in Spain and France. The Sp. P. F. was overthrown by Gen. Franco in the civil war (see SPAIN, *History*), and the Fr. ended at the beginning of 1938. In 1937 Sir Stafford Cripps started a new campaign in favour of a P. F. which was to unite Labour, Liberals, Communists, and dissident Conservatives, but the plan was opposed by the Labour party and led to the expulsion of Sir Stafford and some of his followers, at the Southport Party Conference in April 1939. The P. F. campaign was then abandoned. For the so-called 'front populaire' formed in France under the leadership of Léon Blum, see FRANCE, *History*.

Population. At the death of the Emperor Augustus, the pop. of the then known world was estimated by Bodio to be 34,000,000; while, according to Mulhall, the total pop. of Europe hardly exceeded 50,000,000 before the fifteenth century. It is more than doubtful whether any reliable figures are available much before the nineteenth century, and certainly the pop. of Asia before the middle of the last century was for the most part merely conjectured. Taking the figures of Wagner, Supan, Chisholm, and others we get the following approximate census of the world:

World Population (estimated 1940)

Europe (excluding U.S.S.R.)	380,000,000
Asia (excluding U.S.S.R.)	1,155,000,000
U.S.S.R.	193,000,000
Africa	150,000,000
N. America	144,000,000
Central America and Is.	31,000,000
S. America	101,000,000
Oceania	11,000,000
	2,165,000,000

* Kuczynski estimated that the total pop. of the continent of Africa, shown in the *Statistical Year Book of the League of Nations* for Dec. 31, 1934, as 115,051,000, may be as low as 138,100,000 or as high as 165,300,000, and though the margin of error is large, it is not greater than that for Asia or S. America.

† No regular census of the pop. is taken in many of the S. Amer. countries, and estimates are inclined to be exaggerated and often differ widely. But from the available data it would appear that the pop. of S. America, apart from other Lat. Amer. countries, is as given above, having increased from 38,500,000 in 1905 to 101,300,000 in 1945.

The figures in the earlier table are vague, owing to the fact that the necessity

	1869	1891	1900	1930
Europe	275,806,741	357,379,000	403,360,000	475,000,000
Asia	755,000,000	820,951,000	875,000,000	1,019,000,000
Africa	200,000,000	163,053,000	170,000,000	150,000,000
America	67,896,011	121,713,000	146,000,000	210,000,000
Australia	1,115,000	3,230,000	4,240,000	6,430,000
Polynesia	1,000,000	1,420,000	1,500,000	1,500,000
Polar Regions	—	80,400	80,400	80,000
	1,301,647,782	1,473,729,400	1,600,180,400	1,862,010,000

The table at the top of the next column is an estimate of the totals at 1910. Those for China and India had long been uncertain, but according to the 1941 census the Indian pop. (excluding Burma) was nearly 390,000,000, while the total pop. for China, which was estimated by the Chinese Ministry of the Interior in 1936 at 422,700,000, exclusive of Mongolia and Tibet (5,800,000), and by the League of Nations in 1938-39 at 450,000,000, is now generally agreed to be about 456,800,000 (exclusive of Tibet). These increases on previous approximations go some distance towards explaining the difference between the world total given above for 1930 and the later total, a difference which would be too great for the probable figures of natural increase. It may be noted that the total given by the expert demographer, R. R. Kuczynski, quoting from *Wirtschaft und Statistik* (1939), is 2,139,000,000. The pop. of Europe was estimated by the same authority at 109,000,000 in 1600, 152,500,000 in 1700, 173,000,000 in 1789, and at 525,000,000 in 1934 (the last total shows that he did not accept official totals).

for an official census has in many countries been recognised only in recent years; but in the case of Europe and America they are accurate enough to give some idea of the rate of increase. According to Mulhall, Europe's pop. increased by 62 per cent between 1837 and 1891, notwithstanding that 30,000,000 of its inhab. emigrated to other lands, the bulk having gone to Eng.-speaking countries. A no less striking fact was the gravitation of the rural pop. to towns, and the consequent rapid rise of densely populated cities. These two general features continue to characterise the movement of the world's pop., and in regard to the former, the migrations in recent years, especially immediately prior to the First World War, tended more evenly to distribute the pop. of the Brit. Empire. A further effect is the levelling up of the sexes in the younger dominions. The rapid increase in pop. (until the sharp decline in the rate of increase in European and Amer. countries in the twentieth century led to a reaction in demographic speculation) long exercised the minds of economists most concurring in the view

that improvement in the conditions of life of the working classes was possible only when there existed a check on the increase of pop. The arguments used by Malthus in his *Essay on the Principle of Population as it Affects the Future Improvement of Society* (1798), to which posterity has accorded a mixed reception, were directed to show that pop. increases in a geometrical ratio, while subsistence increases only in an arithmetical ratio, and that consequently, unless there existed checks on pop., a dearth of material for subsistence would soon prevail. No legislator in the world's hist. has yet ventured to lay down artificial checks on pop. (rather has the converse been the case in both anc. and modern states, e.g. the Caducary legislation of Augustus, the Fr. Gov. bounties on large families, and the Brit. system of family allowances). Malthus, in the first ed. of his work, laid down that the positive checks of vice and misery necessarily limited pop. and seemed to say that such checks were nevertheless actual barriers to all social improvement. In the later ed. in 1803 he modified his views, and while regarding war, famine, pestilence, vice, misery, or other 'positive checks' more or less as unmitigated evils, drew special attention to the 'prudential' check on pop. In most countries both positive and prudential checks are active agents in restricting pop., but as time progresses it seems that the latter grows stronger, while war, famine, and earthquake hardly appear to be less effective than hitherto. Large numbers, for example, were exterminated in E. Europe during the Second World War.

In the twentieth century the movements of pop. have been increasingly regulated by govts. This is exemplified by the barriers raised against the settlement of Chinese and Jap. in Australia, and by similar embargoes against these races on the W. seaboard of America; the adoption of a 'quota' by the U.S.A., Canada, and other Brit. dominions, under which the number of immigrants of different nationalities is fixed; the registration of aliens with consequently greater difficulties of settling in European countries. The 'quota' system of the U.S.A., which (prior to the Second World War) favoured Germany, Great Britain, Ireland, France, and N.W. Europe, told severely against Russia, Italy, and S.E. Europe, which before 1925 found America the chief outlet for surplus pop. Such restrictions drew direct attention to the subject of distribution of the world's pop. Australia follows a policy of retaining a white man's land, and the development of her secondary industries tends largely to increase the pop. of her cities at the expense of the rural areas.

The most noticeable general feature of recent changes in pop. has been the great increase of city dwellers. In the U.S.A. in 1920 there were 21,000,000 persons living in cities of 250,000 inhab. against 10,500,000 in 1900, while there were 287 cities of more than 25,000 inhab. against 160 twenty years before. That this trend has been still further accom-

panied is shown by later estimates. These figures are evidence of a general movement throughout white countries which can be accounted for by (1) easier facilities of travel; (2) new trades and industries that develop best where the pop. is the most dense, and (3) improvements in agric. machinery and farming implements which make fewer employees necessary.

Before the Second World War the threatened decline in pop. in Great Britain induced considerable comment and discussion in Parliament and the press. In a memorandum which he presented to the Royal Commission on the Geographical Distribution of the Industrial Population (1939), however, the registrar general reached conclusions which seemed to differ from those of the majority of unofficial statisticians, whose views he regarded as too alarmist. Assuming that fertility remained as it was in 1938, that mortality would gradually decline according to reasonable anticipation, and that the yearly increase of immigration over emigration (as observed in 1931-37) reached vanishing point by 1951 (which appears already to be the case) he forecast total pop. in 1951 at 47,501,000, in 1961 at 47,192,000, and in 1971 at 45,980,000; but assuming a constant ann. supply of 700,000 births (the number registered in Great Britain as at the date of the memorandum), and assuming a concerted attempt to avoid the threatened decline in pop., he forecast the total pop. in 1951 at 47,535,000, in 1961 at 48,376,000, and in 1971 at 48,595,000. It was generally agreed that the pop. decline could only be prevented by raising the fertility rates far above the level of 1938, and the registrar general suggested the necessity of an immediate increase in the ann. number of births of 130,000 (*Statistical Review*, 1938). In fact Britain's pop. had reached more than 49,000,000 by 1948; the pop. is still increasing and, on present indications, should reach a maximum in about 1977, when, unless family size increases, a slow decline will begin. In 1941 a royal commission was instructed to examine the facts relating to and the causes of pop. trends in Great Britain and to make recommendations. Aid'd by three specialist committees, statistical, economic, and biological and medical, the commission in June 1949 pub. a White Paper which concluded that Britain's fate as a world power might be sealed in some thirty years' time unless the people reverted to larger families, i.e. unless at least every fifth couple in the land had one extra child. The White Paper based many of its proposals on one fact of major significance: for some seventy years the size of the Brit. family has fallen, due to deliberate limitation, and now averages only 2.2 children to each married couple. In the opinion of the commission this is 'insufficient for replacement.' Yet only a 6 per cent. increase would be enough to ensure our pop. being stable from generation to generation (for details of the White Paper see under VITAL STATISTICS). See R. K. Kuczynski, *The*

New Population Statistics, 1942, and Eva M. Hubback, *The Population of Britain, 1948*.

Poquelin, Jean Baptiste, see **MOLIERE**.

Porbander, tn. and seaport of P. state on the S.W. of the Kathiawar peninsula, Bombay, India, 110 m. N.W. of Din. It has stone quarries. Pop. (state) 147,000; (tn.) 23,700.

Porcelain (Fr. *porcelaine*; It. *porcellana*, a cowrie-shell), name given to the finer qualities of white or china earthenware, particularly to that variety which possesses a translucent body. It is manufactured from the best china-clay, or kaolin, mixed with felspar, sand, or powdered flints. P. first became known in Europe from examples imported by travellers from China. It is said to have been made in Venice about 1470, and Italy remained the seat of manufacture until the Fr. works, particularly those at Sevres, began to produce it in large quantity early in the eighteenth century. See also POTTERY. See N. Hudson Moor. *The Old China Book*, 1903; W. Burton, *History of Porcelain*, 1906; W. B. Honey, *Dresden China*, 1934, and *European Ceramic Art*, 1949; C. J. Thorn, *Handbook of Old Pottery and Porcelain Marks*, 1947; F. H. Garner, *English Delftware*, 1948; and A. Lune, *French Faience*, 1948.

Porcellanite, Agillite, or Baked Shale, name given to highly indurated and partly fused shales found in contact with dykes and intrusive igneous masses; a result of contact metamorphism (q.v.).

Porch, The, refers to the *stoa poecile* (στωα ποικίλη, painted porch) in which Zeno taught, and is therefore a synonym for the Stoics and their school.

Porcupine (Lat. *porcus*, pig; *spina*, thorn), name given to any species of the rodent family Hystricidae. All are characterised by the possession of spines and hollow quills, smooth-soled feet, non-prehensile tails, and the grinding teeth have external and internal folds. The best-known species is *Hystrix cristata*, the common P., a native of S. Europe and N. and W. Africa. It is one of the largest of rodents, and its specific name is obtained from its crest of long hairs; the body spines are solid, and the tail bears hollow quills. There are eleven other species of *Hystrix*. The genus *Atherura* contains four species, known as brush-tail Ps. The remaining Old World P. is *Trichys lipura*. Tree Ps. belong to a distinct family and are common to the new world.

Pores, see **SKIN**.

Porfirio Diaz, see **CIUDAD PORFIRIO DIAZ**.

Porifera, see **SPONGES**.

Pork, see **PIG**.

Porismar, chief commercial centre of Margarita Is., Venezuela. Pop. 10,000.

Porlock, vil. of Somerset, England, 6 m. W. of Minehead. It is characterised by its steep streets, especially the old main road from P. to Devon, which has a gradient of 1 in 4, and is now used for motor trials. P. Bay is an opening of the Bristol Channel, 4½ m. wide. Before the sea receded P. flourished as a mkt. tn. and seaport. Pop. 1400.

Pornographic Prints and Publications, see under **INDICENCY**.

Porosity. The P. of a building material such as brick or stone is the ratio of pore space in the material to the total volume of the material. P. per cent is calculated from the apparent density d and the density of the powdered material s from the formula $P. \text{ per cent} = \frac{s-d}{s} \times 100$.

The saturation coefficient is the proportion of the total pore space which is filled with water under given conditions. The pores do not normally absorb water to their entire extent, absorption being governed by the degree of capillary attraction they are able to exert. A stone which has a saturation coefficient of 0.8 should be immune from the action of frost. The average percentage pore space of the chief rocks is granite 0.3 to 2.6, gabbro and basalt 0.4 to 0.5, dolerite 0.2 to 1.2, gneiss 2.5 to 4.4, marble 0.4 to 1.8, limestone 1.0 to 20.0, sandstone 1.9 to 22.0.

Porphyrogenitus, see **CONSTANTINE VII.**

Porphyry, name originally applied to an Egyptian rock used for ornamental purposes and known as *porfido rosso antico*. It occurs as a dyke in the granite of Jebel Mokhan (*mons porphyrites*) in Egypt, and shows a felspathic base with plates of hornblende, magnetite, and disseminated oligoclase felspar. The porphyritic felspar shows a red tint due to the presence of a variety of epidote called 'withamite' or 'piedmontite.' The name P. is now applied by geologists to certain acid and sub-acid rocks which show porphyritic structure, not necessarily red. The green variety is found at Lambay Is., off Dublin, and in the Peloponnesus. By this is understood the occurrence of some constituent of the rock in two distinct generations, referable to different stages in the consolidation of the magma. Thus the first formed crystals are large (phenocrysts), and the ground mass, which crystallised later and is approximately of eutectic composition, is aphanitic. The phenocrysts in the Ps. are of orthoclase with occasional plagioclase crystals, giving rise to a parallel intergrowth. The ground mass is generally of felspar or the more acid types of felspar and quartz. Geologists use a descriptive prefix when specifying Ps., thus syenite P., orthoclase P., quartz P., and rhomb P. Some Ps. are given distinct names and thus there are Bostomites and Tinguatos, and some varieties of Monzonites.

Porpoise, or *Phocena*, genus of Cetacea in the family Delphinidae. They are aquatic mammals. The species are characterised by their horny tubercles on the dorsal fin and the compressed and lobed teeth, of which there are twenty-five on each half of the jaw. The young have from two to four hairs, but the adult animal is quite smooth. Ps. resemble small whales, but have more sloping heads. The general colour is black, but the under surface is greyish; the average length is from 4 to 6 ft. *P. communis*, found round Brit. coasts, inhabits the

Atlantic and Pacific, in diet is piscivorous, and in habit gregarious.

Porrentruy, tn. in the canton and 40 m. N.N.W. of the tn. of Bern, near the Fr. frontier; it manufs. watches. Pop. 6500.

Porrex, see 'GORBOUUC.'

Porsenna, or **Porsenna**, Lars, king of Clusium in Etruria; he marched with an army against Rome in order to restore Tarquin to the throne. He captured the Janiculum, but the whole Etruscan Army is said to have been kept at bay at the Sulpician bridge by Horatius Cocles and his two companions. The Etruscan invaders thereafter laid siege to Rome, but peace was concluded by the advice of Scævola. The defeat of the Romans was probably severe, and the myths which cluster round the event only serve to gloss over the catastrophe.

Porson, Richard (1759-1808), Eng. classical scholar, b. at E. Ruxton, Norfolk, the son of the par. clerk there. Thanks to the generosity of friends, he was educated at Eton, and in 1777 entered at Trinity College, Cambridge, where he had a brilliant career. He was fellow of his college in 1782-91. This position he lost by refusing to take orders. From 1790 he was prof. of Gk. at the univ. His life was a struggle till he became a librarian to the London Institution. P. was one of the foremost of Gk. scholars and critics, but he left very little permanent work of his own. He ed. four plays of Euripides, viz. *Heccuba*, *Orestes*, *Phenissæ*, and *Medea*. His most widely read work was his *Letters to Archdeacon Travis* on the disputed passage, 1. John, v. 7, which is considered a masterpiece of acute reasoning. In 1817 an endowment was made in P.'s memory to provide an ann. prize to be awarded to Cambridge undergraduates for the best trans. of a passage of Eng. poetry into Gk. verse. See life by J. S. Watson, 1861, and monograph by M. L. Clarke, 1937.

Porta, Baccio Della, see BARROLOMEO DI L'AGHIOLO DEL FATTORINO.

Porta, Giambattista della, see DELLA PORTA.

Port Adelaide, chief seaport of S. Australia, on the gulf of St. Vincent, 7½ m. N.W. of Adelaide. It is connected by bus and railway services with Adelaide. It has 18,000 ft. of wharves in the inner and outer harbours; there are extensive woolstores, oil installations, and timber yards, and chemical, cement, superphosphate, and other industries. Pop. 33,400.

Portadown, bor. of co. Armagh, N. Ireland, on the Bann, 23 m. S.W. of Belfast. P. has many industries, including the manuf. of linen, lace-making, canning, carpets, pottery, bacon curing, metal boxes, furniture, flour-mills, and boots. Pop. 16,500.

Portage, city and co. seat of Columbia co., Wisconsin, U.S.A., 90 m. N.N.W. of Milwaukee; manufs. hosiery, bricks, and flour. Pop. 7000.

Portage la Prairie, tn. in Manitoba, Canada, 56 m. W. of Winnipeg, on the Canadian Pacific Railway; has railroad shops, brick plants, hemp and threshing-machine factories, grain elevators, and flour- and lumber-mills. Pop. 7600.

Portal of Hungerford, Sir Charles Frederick Algernon, first Viscount (b. 1893), Brit. army officer and marshal of the R.A.F., educated at Winchester and Christ Church, Oxford. Served in the First World War (1914-18); commanded the Brit. garrison in Aden, 1934-35; instructor, Imperial Defence College, 1936-37; director of organisation in the Air Ministry, 1937-38; air member for personnel on the Air Council, 1939-40; commander-in-chief of Bomber Command, 1940; air chief marshal and chief of air staff from 1940 to 1945.

Portal of Laverstoke, Sir Wyndham Raymond Portal, first Viscount (1885-1949), Brit. industrialist and administrator, educated at Eton and Christ Church, Oxford. As one of the commissioners of 1934 he recommended that varied industries were needed in S. Wales, with new financial institutions to start fresh undertakings, and administered all the funds devoted to this purpose. He became regional commissioner for Wales in 1939, and later chairman of the coal production council (1940). As minister of works he became well known, especially for the P. house (prefabricated) which aroused both interest and criticism. From 1912 to 1943 he was minister of works and planning.

Portalegre, cap. of a dist. of the same name, prov. of Alentejo, Portugal, 95 m. N.E. of Lisbon; it has a fine cathedral, and manufs. cloth. Pop. (dist.) 186,000; (tn.) 12,300.

Portal Vein, see CIRCULATION OF THE BLOOD.

Portamento, carrying on from one note to another with a very slight effect of scooping, especially in singing and string playing.

Portaña, Vicente Lopez y, see LOPEZ.

Port Angeles, tn. of U.S.A., in Washington state. The co. seat of Clallam co., it stands on the strait of San Juan de Fuca, 75 m. N.W. of Tacoma. Brewing and fish-canning is carried on. Pop. 12,100.

Portarlinton, mrkt. tn., Eire, on the Barrow, 10 m. W.S.W. of Dublin. Sev. families of Fr. Protestant refugees settled there in 1685. Pop. 2100.

Port Arthur, harbour-hay in S. Manchuria, at the S. end of the peninsula of Liaotung, at the entrance of the gulf of Pe-chih-li. The Chinese name for P. A. is Liu-Choun-Koon, the Eng. name dating from 1861, when one of the leaders of a Brit. naval surveying party was a Lt. Arthur. After the Sino-Jap. war (1894-95) P. A. was occupied by the Jap. who before their evacuation destroyed all the fortifications. Russia had been strongly opposed to the Jap. occupation, and two years later, in 1898, Russia herself obtained from the Chinese Gov. a concession in the Liaotung peninsula, including P. A., to which the Russian trans-Siberian railway was extended. Following the Boxer rising and the Russian occupation of Manchuria, Russia turned her attention to an extension of her influence in Korea. The Jap., who were already exasperated at the Russian occupation of P. A., were determined to

keep Russia out of Korea, and war was declared on Jan. 20, 1904. The Jap. landed a large army on the mainland, and besieged P. A. by land and sea (July 1904). Repeated assaults were made by the Jap. with severe losses, which were sacrificed to the need of a quick victory. At the close of the year 1904 P. A. surrendered to the Jap., with some 40,000 out of the original number of the inhab. Russian losses during the siege amounted to about 5000, and the Jap. to some 60,000. At the subsequent peace concluded at Portsmouth (1905), Russia lost P. A., which became the administrative centre of the Jap. concessions in Kwantung. In 1915 Japan obtained an extension of the lease of P. A. In Aug. 1945 Russian airborne troops landed on P. A. In 1945 a clause in the treaty between the U.S.S.R. and China laid down their joint use of P. A. as a naval base for thirty years. China was to conduct the civil administration, and Russia to be responsible for the defence.

Port Arthur, city of Ontario, Canada, co. tn. of Thunder Bay dist., on the N.W. coast of Lake Superior. It has the largest grain elevator in the world. Industries include sixteen elevators (total capacity 150,000,000 bushels), a ship-building plant with a large dry dock, timber companies, aerated water and wood-working plants, and pulp and paper mills. In the vicinity are deposits of iron pyrites, molybdenum, feldspar for potash, silica for glass, silver, lead, copper, zinc, gold mines, and the largest hematite iron mine in Canada. There is ample and cheap hydro-electric power. P. A. is a health resort for asthmatic persons. In 1854 the Fr. explorers, Groseilliers and Radisson, crossed the neighbourhood on their way to James Bay. In 1870 Lord Wolseley disembarked troops here from E. Canada, on the way to quell the Red Indian rebellion, and named the spot 'Prince Arthur's Landing,' after the duke of Connaught, later governor-general of Canada. It was incorporated as the tn. of P. A. in 1884, and became a city in 1906. Pop. 18,000. 2. Chief port of entry for the Sabine dist. of Texas, U.S.A. It is on the W. shore of Lake Sabine and communicates with the gulf of Mexico. It has important oil refineries. Pop. 46,000.

Port Augusta, seaport of S. Australia, at the head of Spencer's Gulf, Frome co., 210 m. from Adelaide. The dist. has deposits of gold, silver, copper, and coal. There is a woollen and wheat trade, and P. A. is a centre where repairs to rolling-stock are carried out. P. A. was named after Lady Augusta Young in 1852. Pop. 4,500.

Port-au-Prince, cap. and chief seaport of Haiti, W. Indies, opposite the is. of Gonave. It has a fine natural harbour and lies at the further end of a deep horseshoe bay, with a small is. protecting the harbour from high seas and tidal waves. The tn. is built in the form of an amphitheatre; paving and drainage have been modernised. In the lower quarter of the tn., lying at sea level, is the commercial

section; on the heights are private residences. It has the greater part of the trade of Haiti but the climate is very unhealthy. Sugar is treated in the neighbourhood and coffee is exported. Pop. 200,000.

Port Bannatyne (formerly Kamesburgh), vil. on the E. coast of the is. of Bute, Scotland, 2 m. N.N.W. of Rothesay. It is a holiday resort. Pop. 700.

Port Chester, tn. in Westchester co., New York, on Long Is. Sound, 26 m. N.E. of New York city; it is a popular summer resort, and manufs. shirts, stoves, plumbers' supplies, iron goods, etc. Pop. 23,000.

Portcullis (Lat. *porta*, gate, and Fr. *coulisse*, groove), strong grating of timber or iron which was constructed to slide in vertical grooves in the points of entrance gates; it was of lt. origin. The vertical bars were generally of iron or tipped with iron.

Port Darwin, see DARWIN.

Port-de-France, see NUMIA.

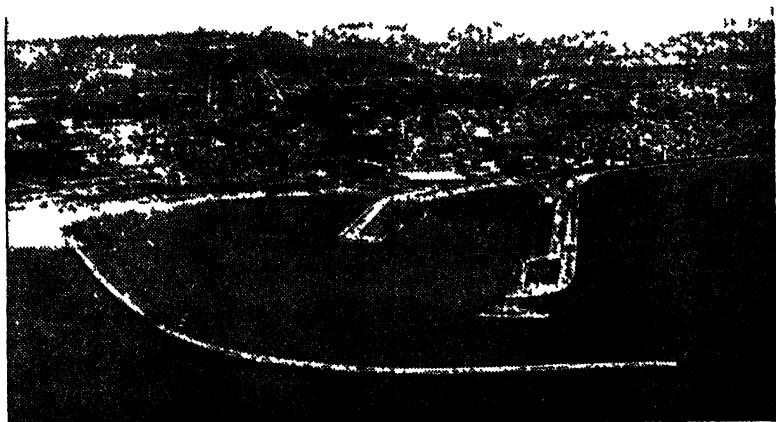
Port de Paix, tn. and port of Haiti, W. Indies, 100 m. N. of Port-au-Prince; it produces coffee. Pop. 15,000.

Port Elizabeth, seaport and second city of Cape Prov., S. Africa, on the W. shore of Algoa Bay, 18 m. S.E. of Uitenhage. It is of great commercial and industrial importance. The tn. of P. E. may be said to date from the arrival of the 1820 settlers, but as a military station it dates back to the end of the eighteenth century. Fort Frederick, which overlooks the city, was built in 1799 and named after the duke of York. Designed for a garrison of 380 men, and mounting eight 12-pounders, the fort is believed to be the oldest building of Brit. construction in Africa S. of the equator. In 1820, 3423 Brit. settlers were landed in Algoa Bay, whose sandy shores and bleak hillocks were at that time only relieved by a few huts clustering around the blockhouse of Fort Frederick. The tn. was at once laid out by order of the acting governor of the Cape, Sir Rufane Donkin, and a stone pyramid, seen on the hill near the lighthouse, was erected by him in memory of his deceased wife, Lady Elizabeth. 'One of the most perfect of human beings, who has given her name to the town below.' The geographical position of P. E. makes it at once the main export and import gateway of the Union of S. Africa. It has risen to be the leading industrial city in the country, with a magnificent harbour, which is equipped to handle any type of freight, including locomotives, double-decker buses, etc. There are some 400 industrial undertakings in the city, producing over £22,000,000 of goods annually and paying wages of over £5,000,000 per annum. It is the largest wool-exporting port in the country, and wool brokers handle the greater part of the entire S. African wool clip. It is a leading citrus export centre with special pre-cooling facilities at the docks. The city is a premier footwear manufacturing centre of S. Africa. Both the General Motor and the Ford factories are estab. in P. E. and are the largest assembly plants for motor-cars in the

country. The Firestone factory and the General Tyre and Rubber Company are two of the largest tyre firms in S Africa, while other ancillary firms to the motor industry include the manu of batteries, glass, and electric light bulbs. P E has a number of fine modern municipal buildings, and Rom Catholic and Anglican cathedrals. There is a world famous snake park and the unique Addo National Park is situated 32 m from the city. P E has greatly advanced in importance since 1949. Pop 156 300 (Euro pean 74 700).

smuggler, Wilson, P and his soldiers fired on the mob, killing six. For this P was tried and condemned to death. He petitioned for a reprieve but was executed on the gallows by a body of men in disguise who dragged him forcibly from prison. P and his wife figure in Scott's *Heart of Midlothian*.

Port Glasgow, tn on the S shore of the firth of Clyde 20 m W N W of Glasgow, Renfrewshire Scotland, made a burgh of barony in 1669. It has a world wide reputation for shipbuilding and ship repairing. Other industries include iron



Port Elizabeth Publicity Association

PORT ILLIZABETH, CAPT PROVINCE

Porter, Endymion (1557-1649), Eng loyalist and groom of the king's bed chamber b in Gloucestershire was a devoted follower of both Charles I and Buckingham. He accompanied the king to Spain in 1623, and was employed on diplomatic missions. He took a leading part in the enterprise of Wm Courten to gain a footing in Madagascar which ended in disaster. Sl. life by Dorothea Townshend 1897.

Porter, Jane (1776-1850), Eng novelist b at Durham she pub in 1803 her first book, *Thaddeus of Warsaw* a popular success second only to that of the better known *Scottish Chief* (1810).

Porter, William Sydney, see HENRY O. Porter, kind of hair of a dark brown colour and lustrous tinge, brewed from malt partly charred or browned by drying at a high temp. See also under *BREWING*.

Porteus, John (d 1736) Capt of the city guard of Edinburgh, gave his name to the 'P riots' at the hanging of a

and brass foundries, textile, rope, plastic and needle manufacturing. Pop 21 000.

Portsmouth, seaside place in Hampshire, S W of W. It exports both iron and coal. Pop 10 000.

Port Hudson, vil on the E b of the Mississippi R in E Baton Rouge Louisiana U.S.A. famous as a Confederate strong hold in the Amer civil war Gen Gardner commanding the garrison succeeded in holding out until Vicksburg capitulated (July 4 1863). P H surrendered on July 9 1863 with its garrison of 8000.

Port Huron, city and co seat of St Clair Co Michigan U.S.A. situated on the St Clair R about 5 m N E of Detroit. It manufactures machinery and engines and is engaged in shipbuilding, possessing six dry docks. It has fibre and paper plants, and automobile and aeroplane manufs. Pop 33 000.

Portici, tn of Campania Italy on the bay of Naples, about 41 m S E of

Naples. Part of the city is built on the site of Herculaneum. Pop. 26,000.

Portico, ambulatory or vestibule, at least partially open on one side, supported by columns regularly spaced. Ps. are generally attached as porches to a building, but sometimes form a separate structure.

Portimão, or *Villa Nova de Portimão*, seaport tn. of Portugal. 27 m. E.N.E. of Cape St. Vincent. It manufs. cork goods. Pop. 8000.

Portioners, in Scots law, the equivalent of the Eng. co-parceners (q.v.), or female heirs-at-law.

Portions, term used to denote the pecuniary provision made in a 'strict settlement' of real estate for the younger children of the marriage. The machinery for raising P. is to vest the property in trustees for a number of years with power to sell so much as may be necessary to produce the specified amount (see also *HOTCHPOT*). In practice the tenant-in-tail usually raises the money in whatever mode is most convenient to him, and on doing so the trustees and younger children join in surrendering the term of years vested in the trustees to him. See *LAND LAWS*.

Portishead, holiday resort of Somerset, England, 8½ m. W.N.W. of Bristol on the Severn estuary. Pop. 4500.

Port Jackson, magnificent natural harbour on one of the coves of which, on the S. shore, was founded the city of Sydney, New S. Wales. It is an inlet about 15 m. long and has an area of about 22 sq. m. The so-called Parramatta R. is really the largest arm of the harbour or inlet. P. J. was so named by Capt. Cook after Sir George Jackson, one of the secretaries to the Admiralty. Cook, however, does not seem to have discovered its potentialities, having in fact only passed near it and landed in Botany Bay, 6 m. to the S. It was the site chosen for the foundation of Sydney by Capt. Phillips, who transferred the people under his command from Botany Bay as unsuitable for settlement to near the site of the present city of Sydney (Jan. 26, 1788).

Port Jervis, city in Orange co., New York, U.S.A., 88 m. N.W. of the city of New York. It has railroad works and iron foundries, and manufs. gloves, glass, and silk. Pop. 10,200.

Portland: 1. Largest and chief commercial city of Maine, U.S.A., co. seat of Cumberland co., 150 m. N.E. of Boston, on Casco Bay, an inlet of the Atlantic Ocean. The Grand Trunk, Boston and Maine, and Maine Central Railways all unite at this city. There is a fine harbour and a regular transatlantic service, also many coastal lines. Large marble and stone quarries are in the vicinity. P. manufs. screens, canned goods, boxes, boots and shoes, paving brick, paint, and varnish, and has important fisheries. There are large shipbuilding yards. It is also a summer resort. P. was first settled in 1632, when known by the Indian name of *Machigonne*; it was burnt by the Brit. in the revolutionary war, but rebuilt a few years later. It was the cap. of Maine

from 1822 to 1832. Pop. 74,000. 2. Largest city of Oregon, U.S.A., co. seat of Multnomah co., on the Willamette R. about 40 m. from the Pacific coast. It lies on both sides of the riv., and is connected by sev. fine bridges. The busiest part of the city is on the W. side of the riv., where the streets run parallel, but the rest of the city is built on a regular plan, the streets crossing each other at right angles. P. has an extensive harbour and good commercial advantages and a large trade is carried on in lumber, grain, and other merchandise. P. was founded in 1815. There are fine views from the higher parts of the city of Mt. Rainier and



British Museum

PORTLAND VASE

Mt. Hood. Public buildings include the medical and law depts. of the univ. of Oregon, Columbia Univ. (Itom. Catholic), and Reed Institute. Pop. 305,000.

Portland, Battle of, fought in 1653 between an Eng. fleet under Blake, Deane, and Monk, and a Dutch under Van Tromp, De Ruyster, and Evetjen. It resulted in a victory for the Eng., but the losses on both sides were heavy.

Portland Beds, middle series, underlying the Purbeck beds and resting on the Kimmeridge Clay, of the Upper Jurassic Oolites. They attain a thickness of about 300 ft. on the Dorset coast (Portland), and contain characteristic fossils, e.g. *Ammonites* (*Oleostephanus*) *giganteus*, *Cerithium* *Portlandicum*, and *Trigonia Gibbosa* are of economic importance for the Portland building stone.

Portland Canal, fjord on the W. side of N. America which forms the boundary between Alaska and Brit. Columbia. It is 60 m. in length, and is bordered by mts. varying from 3000 to 7000 ft. in height.

Portland, Dukes of, *see* BENTINCK.

Portland, Isle of, peninsula of the coast of Dorsetshire, England, $4\frac{1}{2}$ m. in length, connected with the mainland by the Chesil Bank. It is known for its Borsal Institution (formerly prison), penal estab. (formerly military barracks and fortresses), harbour of refuge, and building stone. It contains P. castle, built by Henry VIII. in 1520, and an ant. fortress ascribed to Wm. Rufus. Pop. 12,000.

Portland Vase, beautiful specimen of Gk. art, made of dark-blue glass ornamented with figures in relief in white enamel. It is $9\frac{1}{2}$ in. high and $7\frac{1}{2}$ in. in diameter, and has two handles. Cameos of white enamel, depicting mythological figures, are raised on its surface. It was discovered in a marble sarcophagus at Monte del Grano, near Rome, in the seventeenth century, and was placed in the Barberini Palace, but was purchased by Sir Wm. Hamilton in 1770 who sold it to the duchess of Portland for 1800 guineas. It subsequently became the property of the duke of Portland, who in 1810 lent it to the Brit. Museum, where it was broken by a maniac in 1845; it was, however, skilfully repaired. It was put up by the duke of Portland for sale at Christie's in 1929, but withdrawn at the bidding had reached 29,000 guineas. After having been on loan for 136 years, it was sold to the Brit. Museum in 1946.

Port Lincoln, tn. on the W. shore of Spencers Gulf, S. Australia. It is the main port for Eyre peninsula and is a popular tourist resort. Pop. 3000.

Port Louis, or **Isle of France**, fort. tn. and cap. of Mauritius, on the W. coast. It stands in an excellent harbour, and is the chief commercial port of the is., exporting coco-nut oil sugar and aloe fibre. Nearly all the trade of Mauritius passes through P. L. It is also a coal-station for the Brit. Navy. Pop. 69,500.

Port Macquarie, seaport tn. of New S. Wales, at the mouth of the R. Hastings. Pop. 1500.

Portmadoc, seaport tn. in Carnarvonshire, Wales, 16 mi. S.S.E. of Carnarvon. P. is a centre for excursions in N. Wales, and the adjoining Borth-y-Gest is a popular holiday place. Pop. 1200.

Port Mahon, cap. and prin. seaport of Minorca, on the E. coast of the is. It is a harbour, naval station, and also one of the chief places of quarantine of Spain. The chief exports are grain, livestock, and fruit. Pop. 18,000.

Port Melbourne, formerly called Sandridge, port of Melbourne, Australia. Pop. 13,500.

Port Moresby, important port of entry, in Papua. It has grown rapidly since New Guinea became an Australian mandate. There are regular steamboat services to Sydney. There is a wireless telegraph station and a supreme court. It was frequently raided by Jap. bombers in the Second World War. There are copper deposits in the vicinity. Pop. 3500. *See further under* PAPUA.

Port Nolloth, seaport of Cape Prov., S. Africa, 50 m. S.E. of the Orange R.; it

exports copper and is a railway terminus. Pop. 1500.

Porto, dist. of Portugal, in the prov. of Entre Minho-e-Douro. It takes its name from Oporto, the chief tn. It is level near the coast, but the E. is hilly. Area 880 sq. m. Pop. 938,300.

Porto Alegre, city of Brazil, at the mouth of the Jacuhy, on the N.W. extension of the Patos lagoon. It is the cap. of the prov. of Rio Grande do Sul. is a bishop's see, and contains a cathedral and other important buildings. It has a private univ. The harbour has been much improved by land reclamation work. Textiles, chemicals, and food products are manufactured, and cattle, salted pork and beef, cereals, tobacco, and yerba mate are exported. Many new buildings, both commercial and residential, have been built on the reclaimed land, and P. A. is now one of the most modern cities in Brazil, with two civil airports. Ocean liners call at P. A. and there is a large riv.-trade with the agric. colonies in the N. of the prov. Pop. 321,700.

Portobello, seaside tn. on the S. shore of the firth of Forth in Scotland, 3 m. E. of Edinburgh. According to tradition the name was given to it by one of Adm. Vernon's seamen who was present at the taking of Porto Bello in Central America. The long stretch of sand and the excellent golf course make it a popular resort. The pop. is included in that of Edinburgh of which it forms a part for purposes of municipal administration.

Porto Bello, or **Portobello**, tn. in the central Amer. republic of Panama, on the isthmus of Panama, in Colon prov., on P. B. Bay. The present tn., built in 1584, occupies the site of a colony estab. by Columbus, Nombre de Dios (1502). It was sacked by Drake in 1572, by Henry Morgan in 1668, and by John Spring in 1680. It was captured more than once by the Eng., Adm. Vernon taking it in 1739. It lies at the end of an old paved road to Panama along which gold was brought for shipment. Pop. 500.

Porto d'Anzio, *see* ANZIO, PORTO D'.

Porto Empedocle, tn. in the prov. of Girgenti, Sicily, 3 m. S.S.W. of Girgenti. It exports sulphur. It was captured by the Allies in the Sicilian campaign of 1943 (*see under* ITALIAN FRONT, SECOND WORLD WAR CAMPAIGNS ON). Pop. 11,200.

Porto Ferrajo, or **Portoferraio**, tn. of Italy, in the prov. of Leghorn, cap. of Elba is. It is to the N. of the is. The two houses used by Napoleon in exile still exist. P. F. maintains one of the naval commands left to Italy after the Second World War. Pop. 5200.

Port of London Authority, body empowered under the Port of London Act, 1908, to control the docks and shipping of the Thames from the Isle of Sheppey to Teddington, where the riv. comes under the jurisdiction of the Thames Conservancy. The Act thus created a public trust to take over and administer as one unit all the docks and the whole of the tidal portion of the riv. The Act was the

outcome of the report of a royal commission appointed some years previously to inquire into the whole subject of London's port facilities. For a long time disputes had been frequent between dock proprietors and lightermen and wharfingers, who used the quays, but claimed exemption from liability to pay towards their upkeep. Competition between dock-owners, too, was not always advantageous to shippers, and there were complaints of congestion and chaos. The P. L. A. took over the docks from these companies at a capitalised value of £23,000,000. It was granted powers to impose dues on imports and, to a certain extent, on exports, but care was taken that there should be no duties on goods brought in from other countries intended for re-export, in view of London's great business as an international port and of the importance to the country's mercantile marine of developing still further the business of transhipment. The P. L. A. is responsible for the extension and upkeep of the docks, for dredging the river, and for the orderly control of traffic. It consists of twenty-eight members, ten of whom are appointed the remaining eighteen elected. The Admiralty appoint one member, the Ministry of Transport two, the L.C.C. four, the City of London Corporation two, and Trinity House one. The other eighteen members are elected by the payers of port dues and charges, wharf-owners, and the owners of river craft. The Authority have power, if they think fit, to appoint a chairman and a vice chairman who is not an appointed or elected member of the Authority. The members who are men of business and technical experience, hold office for three years and are unpaid. The P. L. A. is self-supporting and is neither subsidised by the Gov. nor by the local municipal authorities. The Authority's revenue is derived solely from dues and charges for the accommodation provided for vessels and goods and for services rendered. There are no shareholders in the usual meaning of the term. Holders of port stock receive fixed rates of interest. The P. L. A. controls 35 m. of deep-water quays, 150 m. of railway lines, and an enormous acreage of warehouses, transit sheds, and vaults. When the Authority first took over their duties in 1909 a series of comprehensive programmes for the improvement of the river and docks was taken in hand at an expenditure of approximately £20,000,000. The main improvements included the provision of adequate river facilities, the extension of the areas of the dock systems, the construction of channels and the King George V. dock, dry docks, new sheds, refrigerated warehouses, pumping installations to increase the depth of water in some of the docks, floating cranes and grain elevators, etc. A more recent and extensive programme included the complete modernisation of the Royal Victoria Dock, new quays and warehouses at other docks, electrification of berths, and the provision of improved roads, railways, and equipment. The Authority are neither importers nor

exporters of merchandise but custodians only of the goods they handle. They report upon weight, quality, and condition; sort produce to qualities and marks; open packages for inspection, and perform many other expert marketing operations on behalf of merchants. Foremost amongst the various river services which the Authority maintain must be placed the dredging service which has made and maintains the broad approach channel from the estuary into the heart of the port. There is now a good navigable channel, 1000 ft. wide with a general depth of 30 ft. at mean low water spring tides, from the estuary to Cold Harbour Point, a distance of about 35 m. Vessels of 6500 tons gross register now proceed as far as London Bridge. Vessels which draw up to 37 ft. have used King George V. Dock 40 m. from the sea. This has involved the raising and removal of 47,000,000 tons of material at a cost of £2,000,000. Other services are the Harbour Service which patrols the river to control traffic; the Wreck Hauling Service, with full equipment of modern plant, and experienced divers; the Mooring Service, which has its own plant for laying and overhauling public moorings. The P. L. A. offices are at Trinity Square, London, E.C.3. Sir John Anderson was elected chairman in 1949.

Port of Spain, or Spanish Town, maritime town, of the W. Indies, cap. of Trinidad, situated on the N. of the river on the site of the old Indian vil. of Conquerable, on the shores of the gulf of Paria. It superseded San José d'Oruña (St. Joseph) in 1783 as the cap. during the Sp. tenure of Trinidad. It is one of the finest and cleanest towns in the W. Indies. The streets are well laid out and lighted by electricity, and there are electric trams on the main thoroughfares. There are two cathedrals; the Rom. Catholic cathedral, founded in 1816 but only opened in 1832, and Holy Trinity Cathedral, founded 1816 and consecrated in 1823. On the W. side of Woodford Square is the handsome gov. building, or Red House, rebuilt and enlarged in 1903. In this building are the legislative council chamber, the prin. court of justice, and the colonial secretariat. On the N. side of the square are the public library, containing over 25,000 vols., and the tn. hall, the latter an interesting example of old Sp. colonial architecture. It contains oil paintings of Abercromby, Picton, and others celebrated in the annals of Trinidad. The Royal Victoria Institute, destroyed by fire in 1920 and rebuilt in 1922, contains lecture, reading, and recreation rooms; there are a number of spacious parks. The Imperial College of Tropical Agriculture was estab. in P. of S. in 1921. The harbour of P. of S. is safe but shallow. It exports not only all the produce of the is., but also re-exports goods from Venezuela. The prin. exports are opium, rum, petroleum, sugar, asphalt, cocoa, and coco-nuts. Angostura bitters are manufactured. Pop. 107,500.

Porto Grande, or Mindello, tn. on the N.W. side of St. Vincent, Cape Verde Is.

It has an excellent harbour, and is a coaling station.

Portogruaro, tn. in the prov. of Venice, Italy, 27 m. S.W. of Udine. Pop. 22,200.

Porto Leone, see *Pizelus*.

Porto Maggiore, tn. in the prov. of Ferrara, Emilia, Italy, 13 m. S.E. of Ferrara. In the Second World War the par. church was destroyed, and a Madonna by Domenico di Paris and a Pietà by Mazzoni were lost. Pop. 26,200.

Porto Maurizio, or *Imperia*; 1. Mountainous prov. of Italy, bounded on the S. by the Mediterranean. It has an area of 455 sq. m., and produces fruit, wine, and olives. Pop. 150,000. 2. City of Liguria, cap. of the above prov. on the Ligurian Sea, about 46 m. from Nice and 2 m. from Oneglia, with which it forms one com. It is famous for its olive oil. Pop. 28,000.

Porto Novo: 1. Tn. on the Coromandel coast, Madras, India, 30 m. S. of Pondicherry, and the scene of the defeat of Hyder Ali in 1781. Pop. 19,000. 2. Cap. of Duhomey, W. Africa, a Fr. possession. Pop. 27,500.

Porto Praia, or *Vila da Praia*, tn. on the S.E. coast of Santiago, Cape Verde Is., of which it is the cap. Pop. 28,000.

Porto Rico, see *P.R.*

Portoviejo, tn. of Ecuador, on the R. P., 105 m. from Guayaquil and 400 m. from Quito. Hats and baskets are made and tropical produce grown. Pop. 15,000.

Port Phillip Bay, fine bay on the S. coast of Victoria, Australia. It is about 30 m. long. Melbourne lies at its S. end.

Port Pirie, seaport of S. Australia, on Spencer Gulf, 136 m. N.W. of Adelaide. Ore and wheat are exported, and there are smelting works for the Broken Hill silver-lead mines. Pop. 12,000.

Portraiture, art of reproducing the likeness, real, idealised, or conventional, of someone by artistic means. This is of very ant. origin, and is to be found in the ant. Assyrian, Egyptian, and Gk. civilisations, though among these it generally took the form of sculpture. Apollodorus, the Gk. painter, was the first to reproduce light and shadow in P. The painted mummy cases are some of the earliest examples of portraits in the modern sense of the word. In Pompeii, portraits in fresco have been found, and Rom. portraits from the second century A.D. were painted with coloured wax, laid on to thin pieces of wood in solid bodies of the same tint, and were cut to fit on mummy cases. Examples of this P. have survived from the tombs of Alexandria, together with a small framed portrait. Much Rom. P., as with earlier peoples, consisted of busts and statues. The portrait busts from life in Africa will stand comparison with the best classical work which they vividly recall. Giotto made the first true attempt at P. (e.g. Dante), although Cimabue before him is said to have painted St. Francis 'from nature.' Breaking away from the conventions of MS. painting, Fra Angelico in his paintings introduced figure portraits of Pope Nicholas V. and the Emperor Frederick. Gozzoli, his pupil, in *The*

Journey of the Magi, painted a picture composed of contemporary portraits. The art of P. is to be found in figure-painting. Hogarth, in *The Rake's Progress*, also portrayed his contemporaries. In P. proper, however, the persons are represented for their own sake, and on design and the placing of the sitter the success of the portrait depends. Two early portraits are Richard II. in Westminster Abbey, and King John II. of France, painted by Gérard d'Orléans in 1359. By the end of the fourteenth century P. was becoming a separate art in N. Europe, and was further developed by J. Van Eyck, Albrecht Dürer, and Hans Holbein (fifteenth and early sixteenth centuries). Roughly speaking the earlier painters were concerned more with the exploration of the particular shapes of the face as later topographical painters explored landscape. Their interests and business lay with the outward appearance of the man, though this statement must be modified considerably in the case of Holbein. But the later Is. Leonardo da Vinci, Raphael, Titian, Veronese, Tintoretto, brought to an already dignified sitter an atmosphere of grandeur and social magnificence. Rubens and Van Dyck were not slow to learn the lesson and their influence continued in the Eng. school through Reynolds, Gainsborough, Lawrence, and Raeburn, while Hogarth remains homely and does not put on airs. Rembrandt, who knew the painting of Rubens, and who studied Titian and Tintoretto, stands in a class apart. None, with the exception of Titian, stand near him. Rembrandt's insight into the minds and characters of his sitters, whether young or old, is beyond all others, and his means of expression is resourceful and most perfect.

The Fr. school is represented by Jean Fouquet, Clouet, Rigaud, Van Loo, Tonné, De la Tour, Rosalba Carriera, Vigée-Lebrun, David, Ingres, and Veret, and many excellent but lesser men. Holbein was one of the first portrait painters to use the coloured crayon. He left many drawings in charcoal or chalk line, and after him the coloured crayon drawing became more complicated and led to the wonderfully polished performances of the eighteenth-century pastellists (La Tour, Liotard, Chardin). Mention must be made of the miniature painters (see *MINIATURE PAINTING*) whose skill is unsurpassed. Miniature paintings are executed in water colour applied to thin sheets of ivory, or other white substance, in minute dots of colour. The portraits would appear to be excellent likenesses. The decorative effect is lovely and jewel-like. In England N. Hilliard and I. Oliver (Elizabethan) were pre-eminent.

Modern portrait painting shows a decline. Photography has been a serious rival in the field of 'likeness' and has taken the edge off the 'side of the portrait-painter's art. Many of the conventions of portrait painting have worn thin and some fields have been exhausted by the great painters, as Rembrandt or Van Dyck. The state portrait is a thing of

the past and the technique dead. Sitters now are treated rather as still-lives (the influence of Cézanne). The best modern portrait seems to be that in which the sitter is taken unawares in his natural setting, on the lines of Legas and the early Gauguin. A fine example is the 'Victor Lecour' of Walter Sickert. The bronze portrait busts by Epstein are a great contemporary contribution. See W. Wätzoldt, *Die Kunst des Porträt*, 1908; B. Johnson, *Figure Drawing and Portraiture*, 1931; R. H. Goodsall, *Guide to Successful Portraiture*, 1933; H. Murray, *Portrait Painting in Oils*, 1936; W. Hager, *Meisterbilder der Dürerzeit*, 1942; K. Scheffold, *Die Bilder der antiken Dichter, Redner und Denker*, 1943; J. Erith, *Erith on Portraiture*, 1948; and M. J. Friedländer, *Landscape, Portrait, Still-life*, 1949.

Port Royal, seaport tn. on the is. of Jamaica, W. Indies. It is a fort. tn. with naval dockyards.

Port-Royal des Champs, former Cistercian convent, 8 m. S.W. of Versailles. In the seventeenth century it became the headquarters of Jansenism (*q.v.*). In 1709 the remaining members of P.-R. were expelled and the buildings destroyed by order of Louis XV. See A. Arnauld, *Mémoires pour servir à l'histoire de Port-Royal* (ed. B. de la Bruyère), 1742; C. A. Sainte-Beuve, *Port-Royal*, 1901; H. Clark, *Strangers and Sojourners in Port-Royal*, 1932; and H. Lundenbach, *Chroniques de Port-Royal*, 1946.

Port Said, important coaling station and tn. built on the W. bank of the entrance to the Suez canal, with a commodious harbour and discharging basin. It has a large canal trade, and exports cigarettes, salt, cotton, and hides. Pop. 124,700.

Portsea Island, is. off the coast of Hampshire, England. It lies between Portsmouth harbour and Langstone harbour, two inlets of the Eng. channel; the S.W. part of the is. is occupied by the great naval station of Portsmouth, Portsea, Landport, and Southsea.

Port Seton, E. Lothian, see COCKENZIE.

Port Shepstone, port of entry situated at the mouth of the Umzimkulu R. in Natal, S. Africa. Its chief products are tea, sugar, and fruits.

Portslade-by-Sea, seaside tn. 4 m. from Brighton, Sussex, England. It has a polish manufacturing works and a mineral water factory, and a few light industries. Pop. 13,500.

Portsmouth, Earls of, are of a family called Wallop, settling in Hampshire before the Conquest. John (1690-1762) early ingratiated himself with the Hanoverians and became Baron Wallop and Viscount Lynnington, 1720, and first earl of P., 1743. The fourth earl took the name Fellowes. The fifth reverted to Wallop. His son, Newton (1856-1917), was a Liberal M.P. from 1880 till he became sixth earl in 1891; he was under-secretary for war, 1905-8.

Portsmouth and Aubigny, Louise Renée de Kéroualle, Duchess of (1649-1734), mistress of Charles II. of England.

She was the elder daughter of Guillaume de Penancoët, sieur de Kéroualle in Brittany, and came to England in the train of the duchess of Orléans, 1670. On July 29, 1672, she bore to the king Charles 'Lennox,' afterwards first duke of Richmond. In 1673 she was made (*inter alia*) duchess of P. In 1671 the king of France made her duchess of Aubigny. She was the agent of Louis XIV., and was the only mistress of Charles who exerted any serious political influence on him.

Portsmouth, important city, seaport, and naval station covering Portsea Is. and extending on to the mainland of Hampshire, England, 74 m. S.W. of London. On the opposite side of the harbour is Gosport (*q.v.*). P., which was made a city in 1926, includes Landport, Portsea, Southsea, and Cosham. The harbour has a narrow entrance, but afterwards expands into a basin 1 m. by 2 m. It is spacious enough to accommodate a large part of the R.N. and to float the heaviest ship in it. The old *Victory*, Nelson's flagship, was moored in the harbour until 1920. In 1923 she underwent a thorough restoration and is now permanently berthed in the oldest dry dock in the world. A system of fortifications surrounds P., defending the chief naval arsenal of Great Britain. The forts on the Isle of Wight and Portsdown Hill and those standing in Spithead complete the perimeter. The dockyard covers an area of nearly 300 ac., has twelve docks ranging in depth from 21 to 36 feet, dry docks, building slips, a school of naval architecture, and many estabs. connected with the production of the requirements of the navy. In 1923 the torpedo school (H.M.S. *Vernon*) was transferred from old ships to new buildings on the Gun wharf. At Whale Is. (H.M.S. *Excellent*) there is a great gunnery school; on the E. of Portsea Is. are the Tipner magazine and barracks; the Eastney Royal Marine barracks lie at the E. end of Southsea, which is a popular holiday resort and watering place, with a modern pier. From the 5 m. of sea-front the views can be obtained of the Isle of Wight and the famous Spithead roadstead, the scene of important naval reviews. The trade of P. is chiefly connected with the dockyard, the airport and its factories, the building of ships and motor boats, and varied commercial undertakings. The business of Southsea is largely devoted to the interests of the hotel and catering industry for the many thousands of tourists and holiday visitors who come annually to enjoy the amenities. In 1924 P. was made the seat of a new diocese of P. and the Isle of Wight, the old church of St. Thomas à Becket in High Street, which dates from about 1180, becoming pro-cathedral.

Among eminent sons of P. were the writers Charles Dickens, Captain Marryat, George Meredith, Sir Walter Besant; the painters W. L. Wyllie, George Cole, and his son Vicat; the engineer Sir Isambard Brunel; Jonas Hanway, the philanthropist; and John Founds, the crippled cobbler, who devoted himself to the teaching of the poor ragged children

of the neighbourhood and thereby inaugurated the Ragged Schools Union.

Richard Cosur de Lion granted P. its first charter in 1194. By the opening years of the thirteenth century P. had become a naval station of some importance, the docks, enclosed by a strong wall, accommodating the royal galleys. It was plundered by the Fr. three times in the fourteenth century. Its importance as a naval dockyard commenced about 1545. In that year the Eng. fleet assembled at P. prior to the naval engagement with the Fr. off Spithead. It was in P., in 1623, that Felton assassinated the duke of Buckingham. In 1662 the marriage of Charles II. with Catherine of Braganza took place at P. The registers of the cathedral of St. Thomas record the marriage, which, however, was celebrated at the nearby Domus Dei or chapel of the garrison, now temporarily used in place of the ruined church of St. Thomas à Becket. Adm. Byng was executed here in 1757, and, in 1782, the *Royal George* went down with Adm. Kempenfelt and nearly 1000 men. In Sept. 1805 Nelson and his fleet departed from P. for Trafalgar. In June 1918 F.-M. Lord Montgomery unveiled a memorial of the departure of the D-Day invasion force. The memorial consists of a block of stone similar to the road blocks along the Brit. highways in the war. It stands in the garden facing Southsea beach, overlooking the waters through which the D-Day armada sailed on June 6, 1944.

P. was frequently raided by Ger. bombers in the Second World War, being a very important military target. It was one of the tns. to receive the first and last bombs from the Gers., the first raid being in July 1940 and the last raid in May 1944 just before the attack on England by guided missiles replaced the use of bombing planes. Altogether, P. had sixty-seven air raids. Many of them were quite severe, but the major attacks took place in Aug. 1940, and Jan. 10 and March 10, 1941. P. was a city of some 70,000 buildings, and 65,000 of them suffered some kind of air raid damage, many of them on more than one occasion. No fewer than 6650 buildings were totally destroyed. Amongst the buildings destroyed was the splendid guildhall, which was gutted by fire in 1911, and a number of buildings in the historic High Street. P. had a serious housing problem before the Second World War. In 1943 the city council decided to reduce the city's pop. within its present boundaries from 216,000 to 150,000 and to develop a new tn. at Leigh Park. In 1949 some 1250 houses were under construction, but disagreement between city and co. led the Ministry of Tn. and Country Planning to advise them to commission a consultant to review the problems of the whole area around P., including Gosport, Havant, and Fareham. The task fell to Mr. Max Lock, whose outline plan for the P. dist. recommends abandonment of the P. city's projected new tn. at Leigh Park, while accepting a great part of the city plan's other features. The Max Lock plan also

holds that the city can comfortably accommodate 196,000 people. A prominent feature of the plan is the finding of new sites by expanding partially developed places into complete small tns.: Lee-on-Solent would be enlarged from 4000 to 11,300 people, and Fareham from 16,000 to 28,000; while the straggling suburbs of Waterlooville, Purbrook, and Widley, which have 9000 people, would grow into a tn. of 33,350. Pop. 218,300.

Portsmouth: 1. Seaport city of Virginia, U.S.A., on Elizabeth R., in Norfolk co., opposite the city of Norfolk. It has sev. manufs., and near by is the U.S.A. naval shipbuilding yard. P. has paper, cotton, and hosiery mills, oil refineries, fertiliser factories, smelting and chemical works. Pop. 50,700. 2. City and cap. of Scioto co., Ohio U.S.A., situated at the confluence of the Scioto with the Ohio, 110 m. E.S.E. of Cincinnati. It is a centre of the iron and steel industries, and makes shoes, furniture, and stoves. Pop. 40,500. 3. City and cap. of Rockingham co., New Hampshire, U.S.A., and a seaport on the Atlantic, 50 m. N. of Boston. The treaty of peace terminating the Russo-Jap. war was negotiated here in 1905. Its greatest prosperity existed before the decline of the W. India and China trade, carried in sailing ships. It possesses outstanding examples of eighteenth-century Amer. architecture. There is a U.S.A. navy yard. The navy yard of P. is on two is. (Fernald's and Savery's) opposite the tn., but is included in the tn. of Kittery, Maine. The prin. industry is the manuf. of footwear. Pop. 14,500.

Port Sudan, seaport of Egypt, on the Red Sea, 40 m. N. of Suakin. The harbour was opened in 1909 by the khedive. It exports cotton, gums, salt, and ivory. Salt pans here supply the whole needs of the country. There is railway communication to Berber on the Nile. Pop. 25,000.

Port Sunlight, model vil., 3 m. S.S.E. of Birkenhead, Cheshire, England, founded in 1888 by W. H. Lever (later the first Viscount Leverhulme) to house the employees of his soapworks. The P. S. soap factory is now the largest of its kind in the world. The vil. contains some 550 houses and flats and includes a church, schools, hotel, theatre, vil. halls, and shops. It is also the home of the Lady Lever Art Gallery, built by the founder of P. S. in memory of his wife.

Port Talbot, small port in Glamorgan-shire, Wales, 7 m. E.S.E. of Swansea. It has a good coasting trade and a fine dock. There are coal mines and copper works. Pop. 41,000.

Port Tampa, seaport of Florida, U.S.A., in Hillsborough co., on the peninsula separating Old Tampa Bay from Hillsborough Bay. It is the deep-water port for Tampa (g.r.), 9 m. N.E. There are oil and coal bunkers, and the chief exports are phosphate and lumber. Pop. 1200.

Port Townsend, co. seat of Jefferson co., Washington, U.S.A., on Puget Sound, 40 m. N.N.W. of Seattle. It is a port of entry and customs station, and has

considerable trade in lumber, agric. produce, and fish. There are boiler works, foundries, and pickling and canning works. Pop. 4,700.

Portugal, republic of W. Europe, occupying one-fifth of the Iberian peninsula. It is bounded on the N. and E. by Spain, and on the W. and S. by the Atlantic Ocean. In shape it is a parallelogram, its greatest length being 362 m., and its breadth varying between 80 and 140 m. The total area is 35,101 sq. m., which includes the areas (1236 sq. m.) of the Azores and Madeira Is., recognised as an integral part of the republic. P. is divided into eleven provs.: Algarve, Alto Alentejo, Baixo Alentejo, Beira Alta, Beira Baixa, Beira Litoral, Douro Litoral, Estremadura, Minho, Ribatejo, and Trás-os-Montes e Alto Douro. It has a seaboard of nearly 500 m. The coast is low, flat, and unbroken, the only important promontories being capes Mondego, Carvoeiro, Roca, Espichel, Santa Maria, and St. Vincent. The prin. mts. are continuations of Sp. ranges. The mts. of Galicia are continued S. into the Transmontane system (Peneda, 4723 ft.; Marão, 4642 ft., etc.), lying between the Rts. Minho and Douro in the N. of Portugal. Between the Douro and the Tagus there extend two ranges, the N., including Montemuro (1534 ft.), and the S., the Sierra da Estrella (6540 ft.), a W. continuation of the Sp. Sierra Guadarrama system. S. of the Tagus and between it and the Guadiana are many isolated mt. masses, among the most lofty peaks being Foz da (2062 ft.) and Ossa (2128 ft.). Much of the scenery is extremely beautiful. The rivs. already mentioned have their sources in Spain, and flow through P. to the Atlantic. The Mondego, the longest wholly Portuguese riv., rises in the Sierra da Estrella, and has a length of 130 m. Smaller rivs. are the Vouga, Sado, Lima, Cávado, and Mira. The rainfall is heavy, especially in the N., and the climate temperate and equable, except in the valleys, where the summer is excessively hot, and malaria and fever prevail on account of the swamps and the salt marshes. The geology, fauna, and flora of the country differ little from those of Spain (q.v.). Lisbon is the cap., having a pop. of 709,200; Oporto, the second city, has a pop. of 262,300. Other mts. are Funchal, 51,900; Coimbra, 35,100; Setúbal, 35,000; Braga, 29,900; and Évora, 21,900. The total pop. of P. is 8,312,200 (including the Azores and Madeira).

Constitution and Justice.—Until 1910 P. had a hereditary monarchical form of gov. In that year, after a short revolution, a republic was estab. Its constitution provided for a bi-cameral legislature under a president elected for four years. In 1933, this was superseded by a new constitution, adopted by plebiscite. This provided for an authoritarian republic on a corporative basis. The president is elected for seven years by direct vote of the electors and is assisted by a privy council. There is a single-chamber legislature of ninety members elected for four years, but in practice the candidates are

almost exclusively nominated by the gov. party. There is also a corporative chamber composed of representatives of commercial corporations and local authorities, whose chief function is to advise on legislation. Portuguese constitutional law is hostile to liberal principles. Article 8 of the constitution, however, defines under a score of heads the rights of the Portuguese citizen, some of which are liberal in tendency. Half of them deal with the citizen's ordinary rights before the law (e.g. no arrests without charge; the right to be defended in court, etc.). The rest are the right to good name and reputation; liberty of religious beliefs and practices; freedom in the choice of work or profession, and freedom of association. The liberty of expressing opinions and holding meetings is, however, liable to control by an amendment of the constitution. The gov. maintains a strict hold on any movement which, in its view, is inimical to the national interest or the foundations of the 'New State'. The family, rather than the individual, is the unit of which the state is composed; next comes the guild or corporation. The corporations are not only trade and industrial organisations, but also bodies engaged in science, literature, etc. (*see also* CORPORATIVE STATE). Within the corporation, employers and employed form a single guild. The representatives of the corporations form the corporative chamber. All Bills and motions, projected treaties and conventions, must be submitted to the corporative chamber before being discussed and voted on in the assembly. The ministers are appointed by the president of the republic. They need not be members either of the corporative chamber or of the assembly; if they are, they may not sit in their respective chambers during their term of office. The gov. exercises legislative authority to a considerable extent when the assembly is not in session. It depends on the confidence of the president, and its retention of office does not depend on the fate suffered by its Bills or on any vote of the assembly.

P. is divided into 154 *comarcas* for judicial purposes. In each *comarca* there is a lower court; in the *comarca* of Lisbon there are nineteen, and twelve in that of Oporto. There are three courts of appeal. The Supreme Court has its seat at Lisbon.

Communications.—The state owns all of the 2216 m. of railway lines. There were in 1947 16,000 m. of roads and over 6650 of telegraph lines. The merchant marine numbers about 950 vessels with a combined tonnage of 318,000. Air services from Lisbon connect P. with all parts of the world.

Defence.—The army is maintained by conscription, every Portuguese male between twenty and forty-eight being liable for service. The period of general training is twenty-eight years, the first six of these being with the active units. Pre-military training is entrusted to the Portuguese Youth Movement. Continental P. is divided into four areas for military purposes, these being Lisbon,

Coimbra, Oporto, and Lvoia. There are sixteen infantry regiments besides artillery, ordinary and mechanised cavalry etc. Equipment and training are generally most modern. The navy consists primarily of six sloops, five destroyers, six submarines and four gunboats. Many of the Portuguese naval vessels are of Brit. manuf. A naval air force was established in the First World War. During the Second World War it consisted of about fifty machines.

Production. P is a fertile country except in the most mountainous areas and more than 60 per cent of the pop. is



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CASTLE OF LOUÇA (FOURTH CENTURY)

A medieval stronghold on a hill in a valley
about 10 miles from C.

engaged in agriculture. Methods however, are frequently primitive though the Salazar Gov. has done much to encourage the adoption of modern machinery and about 5 per cent of the land fit for cultivation has not yet been developed. Of cultivated land 84 per cent of the land is cultivated for cereals, pasture, etc., 26 per cent for timber, 6 per cent for fruit trees and 55 per cent for vineyards. Vines are widely grown and wine is the most important product. Other products are maize, rice, wheat, tomatoes, olives, figs, onions and oranges. The forests yield principally pine, oak, chestnut, and cork. Cork is a prime export, since P. produces more of it than all the other countries of the world combined. The production of resin and turpentine derives from P.'s forest production. P. possesses great mineral wealth including anthracite, coal, copper, iron, lead, sulphur, tin, wolfram and

many manganese, iron pyrites, slate, and basalt. But the mines are not worked to capacity because of the shortage of electric power. Lisbon and Oporto are the prime industrial towns, the chief manufactures of the country being soap, flour, tobacco, cork, olive oil, cement, textiles, gold and silver filigree and food canning. *Cesulejos*, or porcelain tiles are made. This ancient industry is a Moorish inheritance, and the tiles are widely used in both the exterior and interior decoration of buildings of all kinds. There are porcelain factories at Sagres, Vista Alegre, Gaya and Coimbra. The wine industry at Setúbal is very important. Lisbon is the centre of the shipbuilding trade. The heavy wine trade necessitates large cooperages. The chief exports are saddles and other preserved fish, wine, cork, fruit, vegetables, timber, cotton, olive oil, wolfram, resin, iron and tin ore and pyrites. In 1947 Portuguese exports were valued at £306,941,000 and imports in the same period at £1462,1403, escudos. In 1948 Gt. Brit. imported Portuguese goods to the value of £5,307,070. Portuguese imports of Brit. goods totalled £25,536,183.

Religion. — Roman Catholicism is the state religion. There are 5 at Lisbon, Braga and Lvoia. Other religious creeds are tolerated. The Church suffered most at the period when it was identified with the unpopular monarchy and aristocracy. A bitter anticlericalism characterised the Liberal political movement of the nineteenth century which culminated in the revolution of 1910 and the establishment of the republic. The Church was disestablished and its property sequestered, yet the new order did not bring the expected national regeneration and economic prosperity. Since 1924 there has been a reaction against anticlericalism. The (Carmenist) Salazar regime is frankly Christian in character and its public association with the Church appears popular. The separation of Church and State was maintained in the 1933 constitution. The Concordat with the Holy See signed in 1940 restored buildings and property to the dioceses and parishes. Religious marriages were to be civilly recognised and divorce of parties married by the Church forbidden. The Catholic Shrine of Our Lady of Fatima is in P.

Education. — Primary education is free and compulsory for children between seven and fifteen. In 1947 there were 10,248 primary schools with 533,400 pupils and 43 secondary schools divided into *liceus* and technical colleges. There has been compulsory primary education in theory since 1911 but it is not enforced adequately, and the numbers of schools and teachers are also inadequate. In 1947 49 per cent of the pop. over seven years of age was illiterate. Secondary education although limited is of a high standard. The number of pupils at secondary schools in 1947 was about 20,000. 25,000 attended private schools. There are three univs. with various faculties at Coimbra, Lisbon and Oporto.

There are training colleges for teachers in the most important tns., commercial schools, a military and naval college, eccles. seminaries, and colleges for music and art. There were 8600 univ. students in 1947. A technical univ. was founded at Lisbon in 1930; it had nearly 3000 students in 1947.

Colonies.—The prin. dependences and colonies of P. are, in *Asia*: Goa, Macao, Timor; and in *Africa*: Cape Verde Is.; Principe and St. Thomas Is., Guinea, Angola, and Mozambique. The Portuguese empire is the oldest colonial empire in the world. It has an area of over 800,000 sq. m., and a pop. of nearly 11,000,000. Goa (q.v.), in India, became a Portuguese possession in the sixteenth century, a result of the wave of missionary and trading enthusiasm then sweeping P. It has an area of 1400 sq. m. and a pop. of 624,000. The largest Portuguese colonies are Angola (q.v.) with 485,000 sq. m. and 3,000,000 inhab. and Mozambique (q.v.) with 297,731 sq. m. and about 5,085,600 inhab. These two African dependencies with their harbours, which are regularly used by Brit. shipping, have been developed extensively since 1928. Every effort has been made to utilise their mineral and agric. resources, and communications have been greatly improved. They have important railways which give access to Lobito Bay, Beira, Lourenço Marques, Mafeking, and Komati Port.

History.—The early hist. of P. practically coincides with that of the whole of the Iberian peninsula. The sway of Carthage (third century B.C.) gave place to that of Rome. Lusitania, comprising that part of P. which lies S. of the Tagus, was formed into a Rom. prov. during the Augustan period, and the country prospered under Rom. rule. From the fourth to the eighth century it was overrun by hordes of Alani, Suevi, Visigoths, Saracens, and Arabs in succession, and it was not until the twelfth century that a kingdom was estab. Ferdinand of Castile and his son Alfonso VI. won back the ter. forming the country of P. from the Moors. Alfonso Henrique, grandson of the latter count, maintained throughout his lifetime a state of continual warfare on the Galician frontier. In 1143 he obtained for P. the status of an independent kingdom. In 1147 he captured Santarem and Lisbon from the Moors and made the latter his cap. He was succeeded by Sancho I. (1185–1211), who was engaged during the earlier part of his reign in war with the Moors and with Alfonso IX. of León, and later, by his encouragement of local self-government, won for himself the title of *O Porador* (founder of cities). He opposed the claims of Innocent III., but in 1210 submitted to papal authority. Alfonso II., the Fat (1211–1223), is notable as the first king to summon the Portuguese cortes. Sancho II. (1223–48) drove the Moors from Alentejo, and won many successes in Algarve. He was forced to abdicate in favour of his brother, Alfonso III. (1248–79), who proclaimed himself *rei* (king). He extended his kingdom to Algarve, and strengthened

it by marrying the daughter of Alfonso X. of León and Castile. Thus the kingdom of P. reached its present European boundaries.

Diniz (1297–1325) devoted himself to the constitutional and social reconstruction of his kingdom. He encouraged agriculture, industrial arts, commerce, and maritime enterprise, and was a patron of learning, founding the univ. of Coimbra in 1290. He negotiated a commercial treaty with England (1294) and formed a royal navy. Alfonso IV. (1325–57) was chiefly occupied in wars with the Castilians and Moslems, while his successor, Pedro I., the Cruel (1357–1367), endeavoured to lessen the tyranny of the nobility and clergy. The claim of Ferdinand (1367–85) to the throne of Castile was contested by Henry of Trastámara. Ferdinand allied himself with the Aragonese and Moors and with England. On his death the Burgundian line came to an end, and the cortes asserted its right to elect the new king, choosing John I. (1385–1433), an illegitimate brother of Ferdinand, and the first of the house of Aviz. In 1385 the united Portuguese and Eng. forces defeated the Castilians at Aljubarrota. The Anglo-Portuguese alliance was confirmed by the treaty of Windsor (1386); and John cemented the friendship between the two countries by marrying in 1387 Philippa, daughter of John of Gaunt. During his reign the period of expansion overseas and of geographical enterprise began with the capture of Ceuta on the N. coast of Africa, in 1415, by his son Prince Henry the Navigator (d. 1460). In the fifteenth and sixteenth centuries there was a period of discoveries which made P. at one time the greatest maritime country in the world. Prince Henry and his captains explored the Atlantic and the W. coast of Africa. They doubled Cape Bojador (1433), and discovered Madeira and the Azores (1442), Senegal (1445), and Cape Verde (1446). The first consignment of slaves was brought to Lisbon in 1481. The Cape of Good Hope was doubled by Bartholomew Diaz in 1486, and Vasco da Gama reached India in 1497. In 1500 King Emanuel (Manoel) assumed the title of 'Lord of the conquest, navigation, and commerce of India, Ethiopia, Arabia, and Persia,' and in the same year, Portuguese settlements were made in Brazil and on the W. coast of India. Gaspar and Miguel Corte-Real reached Greenland in 1500, and fresh colonies were made in E. and N. Africa. Albuquerque conquered Goa (1510) and Malacca (1511); the Portuguese dominion in the Malay Archipelago was founded (1512–14), and commercial relations were entered upon with China (1517) and Japan (1512).

At this time P. was at the height of her power. Her commercial enterprise knew no limits, and Lisbon was recognised as the great centre of oriental traffic. Her fall was due to the persecution and later expulsion of the Jews, who contributed greatly to the wealth of the country, and to the introduction of the Inquisition

(1536) and of the Jesuits (1510). In 1578 the country suffered an overwhelming disaster in the defeat and death of the young King Sebastian, grandson of John III. (1521-27), at Alcazar-al-Kebir. Sebastian was succeeded by his uncle, the senile Cardinal Henry, last of the Aviz dynasty. Among the many claimants to the crown was Philip II. of Spain, who in the confusion and disaffection marched boldly into the country and had himself crowned king. From 1581 to 1640 P. remained under the Sp. suzerainty, thus becoming involved in the wars in the Netherlands and Germany. England and Holland seized the Portuguese possessions in S. America and the Malay Archipelago. After sev. insurrections, P. regained her independence, and John, duke of Braganza, a descendant of Emanuel I., was crowned John IV. in 1640. England recognised the Braganza dynasty when Charles II. married Catherine of Braganza in 1661. This confirmed the friendly relations between the two countries, which dated back to a treaty of 1373. The country became involved in a colonial war with Holland, and a more serious conflict with Spain. In the reign of Alfonso VI. (1656-83), son of John IV., the Sp. were defeated at Elvas (1659), Ciudad Rodrigo (1664), and Montes Claros (1665), and the war concluded with the treaty of Lisbon (1668). The Anglo-Portuguese alliance was renewed by the treaty of Methuen (1703), and P. became involved in the war of the Sp. Succession. P. had lost all her important colonies except Brazil, and was no longer one of the chief powers in Europe. Pombal, a minister of Joseph (1750-77), did his utmost to restore the kingdom to its former position by strengthening the monarchy and encouraging colonial development. He expelled the Jesuits (1759), organised education, and carried out reforms in the defence of the country. On the accession of the mad Queen Maria I., he was deprived of office (1777), and P. relapsed to its former condition. In 1792 Maria's son, John, was appointed regent. In the European war which broke out at the end of the century Dom John obtained substantial aid from Great Britain against Spain and France, but in 1807 left P. for Rio de Janeiro. His act was followed by the Fr. occupation of P. and the crowning of Joseph Bonaparte at Madrid, resulting in the Peninsular war (q.v.), which continued till 1814. In 1816, on the death of Maria I., John VI. succeeded to the throne, but remained in Brazil, appointing Marshal Beresford as his viceroy. The discontent which this caused among his subjects resulted in a revolution (1820) and the estab. of a democratic form of government. John hastened back to Lisbon, and promised to obey the 'constitution of 1822.' Meanwhile Brazil had obtained complete independence, with Dom Pedro I. (q.v.) as constitutional emperor. On the death of John VI. (1826) Pedro, who was now Pedro IV. of P., estab. the basis of the constitution which remained in force until 1910,

and then, returning to Brazil, abdicated in favour of his seven-year-old daughter, Maria da Gloria, who ruled with her uncle Miguel as regent. The latter headed a reactionary movement, and with the aid of the nobility, military, and clergy, proclaimed himself king in 1828. With the help of Brit. troops, Pedro re-estab. his daughter, reintroducing the constitution of 1826. But the emperor died the same year, and a period of misrule and confusion followed, the government being alternately in the hands of the Septembrists and Carlists. The constitutional party owed much of its victory, in 1834, to Eng. support and protection. Maria's son, Pedro V. (1853-61), was succeeded by his brother Luiz I. (1861-89).

Towards the end of the nineteenth century P. realised, a little too late, the value of her African possessions, and was obliged to cede some of her ter. in E. and W. Africa, giving up her claim to Nyasaland in 1889. In that year Carlos I. ascended the throne, and was assassinated with the crown prince in 1908. His second son, Manoel II., was de throne in Oct. 1910, and the republic was proclaimed on Oct. 5. The Provisional Gov. was under the presidency of Dr. Braga, who in Aug. 1911 was succeeded by Dr. Manuel de Arriaga, the first president of the constitutional republic. A royalist counter-revolution under Pablo Concelos (Sept. 1911) was suppressed and also an extremist 'Red' revolution in Jan. 1912. The 'Reds' and the Royalists were not represented in the first Congress; the strongest party were the Democrats, into which Alfonso Costa had transformed the fighting revolutionary force, the Carbonario. After three ineffective coalition Cabinets, Costa became in Jan. 1913 a rilled dictator, who, however, respected parl. forms. In Feb. 1914 he was succeeded by Bernardino Machado, whose policy was conciliatory. In the First World War royalist P. sympathised with Germany, and the Republicans with the Allies. On Dec. 9, 1914, the pro-ally Premier, Machado, was succeeded by Azavedo Coutinho. The non-interventionist president, Arriaga, allowed the Gers. to engineer a neutralist *coup d'état* (Jan. 1915) which made Gen. Pinheiro de Castro a dictator, but in May he was overthrown. Dr. Braga became provisional president, being succeeded in Aug. by Dr. Machado. In Nov. Costa returned to power, and his allowing the Allies the benefit of interned shipping caused Germany to declare war, March 9, 1916. P. had been traditionally allied to England for five centuries. P.'s chief theatre of war was E. Africa, while Gen. Termagnum commanded the Portuguese Expeditionary Force in France. A war Cabinet was formed by Dr. Almeida, including Costa, who formed his own Cabinet in April 1917, but a Lisbon insurrection in Dec. drove both Costa and president Machado out of office. Brachamps became provisional president and Major Paes, leader of the revolutionaries, Premier, later (May 10, 1918) being elected president, but was assassinated

In Dec. 1918, Bernardino de Sá formed a ministry with Silva Antunes as provisional president. In Jan. 1919, Couceiro established a Royalist Gov. at Oporto but was suppressed. In Aug. Dr. Almeida was elected president. During 1920 there were nine successive cabinets and a revolution in Oct. 1921. In 1923 Almeida's presidency terminated and Teixeira Gomes succeeded him. He attempted reconciliation in politics but financially Portugal's bankruptcy threatened also her colonial possessions. On Dec. 11, 1926, the venerable Dr. Machado was

re-elected president in 1935, 1942 and 1949 but Salazar was in fact the prime force in Portugal. During the Second World War Portugal remained neutral but in 1943 under the treaty of 1373 he granted Britain facilities to set up air and naval bases in the Azores. Britain handed back these bases in June 1946. Salazar's benevolent dictatorship has been apparently popular and responsible in character. The assembly set up under the constitution of 1933 provided a form of safety valve but with the excesses of the later monarchy and of the



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THE LEBREIRA QUAY AND THE DOM LUIS I BRIDGE OVER THE DOURO

again elected president but in July 1926 his powers were transferred to Gen. Gomes da Costa who had engineered a successful revolution until his air by Gen. Carmona who then became a military dictator. On March 25, 1928, he was elected president. The finance minister, Dr. Salazar, abolished nominal and treaties of commerce and signed with Estonia and Finland and of arbitration with the U.S.A. (1929). A new ministry came in on Jun. 20, 1930 with Gen. Oliveira as premier and President Carmona continued his mild dictatorship despite protests against it which led to revolt and revolution in Madeira and the islands of the Azores (April 1931).

In 1932 Salazar became Prime Minister. Between Sept. 1944 and Feb. 1947 he also held the post of foreign minister

republic till in his mind Salazar had not been prepared to entrust any substantial measure of power to an elected body and that of the assembly is very limited. It has been able to criticize candidly however and has frequently done so on points of detail. In 1949 Portugal participated in the N. Atlantic Treaty. Public opinion seemed to welcome the change but not as a significant change but merely as a logical continuation of a policy pursued for many years. The presidential elections of 1949, during which censorship of the press was considerably relaxed, passed off peacefully a striking contrast to elections held at the beginning of the twentieth century. The opposition candidate, Gen. de Matos, eventually withdrew his nomination. The opposition gave no sign that they could sustain a peaceful parliament and

the opposition presidential candidate, though a respected statesman of liberal traditions, offered little constructive criticism of the gov. and had no programme of his own. Consequently, it was impossible to gauge either the extent of the opposition, or the basic causes underlying it. Subsequent assembly debates suggested that these included discontent with gov. policy on educational and agraric matters and on the Angola administration.

P. has remained a poor country with a low standard of living. The Salazar Gov. recognised that without greater industrialisation little can be done to raise the general standard of living, and put forward an ambitious scheme of public works and plans to develop power schemes. A series of hydro-electric works connected with dams on the Rts. Cavado and Zezere were begun with the same object, to be completed in the early 1950s. The electrification of all the railways is under consideration, and a number of new deep-water docks planned for the port of Lisbon. One of the many new roads contemplated or under construction involves the building of a large bridge over the R. Tagus at Vila Franca do Xira.

Language and Literature.—Portuguese, a branch of the Roman branch of languages, has grown out of Lat. dialects spoken in the prov. of Lusitania at the time of the Rom. occupation, and through the influence of the Saracen invaders an Arabic element was later introduced. Portuguese is strictly connected with Gallego, the dialect of the old kingdom of Galicia. With the growth of national pride in P., the language became more differentiated from the other Romance tongues of the peninsula. Portuguese is spoken by about 8,000,000 people in P., by about 44,000,000 in Brazil, by about 10,000,000 in the Portuguese colonies of Africa, about 1,000,000 in Asia, and about 1,500,000 in Oceania, apart from the 'pidgin' Portuguese varieties in Africa, India, and S.E. Asia. Gallego is spoken by about 3,000,000 people in N.W. Spain. The reign of Alfonso III. saw the production of many troubadour songs, the oldest collection being the *Cancioneiro da Ajuda*. The royal patronage of bardic was continued by his son, King Diniz (1279-1325), himself the author of numerous trovas and pastorals. The early court poetry is preserved in the *Cancioneiro Geral* (1516), compiled by Garcia de Resende (1470-1536). Throughout the fourteenth and fifteenth centuries many prose chronicles, lives of saints, and genealogical registers were written, and the legends of Arthur, Merlin, Amadis of Gaul, and other heroes of chivalry, legends which permeated the literature of W. Europe, early penetrated into P. Portuguese drama went through the natural stages of religious play, morality, farce, and comedy. The founder was Gil Vicente (1470-1536), who gathered round him many disciples, including Alfonso Alvarez, Antonio Ribeiro, Antonio Prestes, and Balthazar Dias. Antonio de Ferreira (1528-69), author of *Inez de Castro*, was a superb writer of tragedy. The old Provençal traditions of

poetry gave place to the classic influence which spread from Italy through Spain. Sá de Miranda (c. 1485-1558), poet and dramatist and founder of the classic schools, was strongly influenced by contemporary It. literature. His *Comedias* (1550), written in collaboration with Antonio de Ferreira, became, like his poems, popular in Lisbon. The new classic poetry did not, however, grip the people at large, and was confined in its popularity to court circles.

But with the growth of maritime and commercial prosperity, new life was fused into the literature of P., and the patriotism of the people found expression in Camoens's *The Lusads* (1572), a great national epic. The epic form became popular, and Camoens had many imitators, among whom may be mentioned Peroira de Castro (1571-1632), Sousa de Macedo, Sá de Meneses (d. 1661), and Garcia de Mascarenhas. During the years of Sp. rule (1581-1640) the national spirit received an overwhelming blow which necessarily affected the literary output. For a time even Portuguese was abandoned in favour of Sp. In the seventeenth century, however, some good histories were written, notably by Brandão (d. 1637) and de Meneses (1673-1743). In the early eighteenth century Fr. influence prevailed with most Portuguese poets, but the general standard of taste was raised by the two poets, F. M. do Nascimento (1734-1819) and Manoel du Bocage (1767-1805), who endeavoured to purify and enrich the language and to preserve the early national traditions. The early nineteenth century witnessed a spirit of revolt against the untorn forms, and a general revival of letters. The chief exponents of the Romantic movement in P. were J. B. Gomes (d. 1803), J. A. de Macedo (d. 1831), N. T. da Almeida (d. 1811). Of the nineteenth century and modern poets the most notable are A. de Castilho (1800-1875), J. de Almeida Garrett, the dramatist (1799-1854), J. de Barros, Palmirim, Magalhães, and Soares de Passos; among the historians are Hierculano (1810-79), Varnhagen, P. da Silva, Luz Soriano, and Oliveira Martins. The novelists of the nineteenth century are represented by Rebelo da Silva and Eça de Queiroz (d. 1900), and of the twentieth century by Emanuel Ribeiro and Raul Brandão. The political conflicts of the first three decades of the twentieth century caused some decline in Portuguese literary standards, the poet Eugénio de Castro (b. 1869) being an exception to this rule. But after 1930 a modern school of literary artists grew up, combining some features of Fr. and Amer. literature with a basis of intense nationalism, and retaining the essentially Portuguese preoccupation with the spiritual. This school includes Fernando Pessoa, Camillo Pessanha, José Régio, Almada Negreiros, Gaspar Simões, and Maria Archer.

Art.—There are some Rom. remains in P., notably at Évora, where there are impressive ruins of a temple to Diana. Truly Portuguese art, however, dates from a later period. One of the finest

examples is the Romano-Gothic cathedral at Evora (1185-1204). Numerous religious buildings in Lisbon, Coimbra, and Oporto illustrate the development of Portuguese Gothic, the purity of line being particularly notable. Portuguese art of the late fifteenth and early sixteenth centuries was much influenced by Moslem and Burgundian styles. Under these influences, there evolved an artistic pattern differing considerably from the styles generally prevalent outside the Iberian peninsula at the same period. The master craft-man of Manueline style was João de Castilho, and fine examples of his work can be seen in Evora, Elvas, Coimbra, and Cintra. The combination of Burgundian lavishness of detail and Moslem simplicity of architectural forms, grafted on a basis of late European Gothic, results in buildings which are both exquisitely decorated and yet fundamentally simple, having a sometimes almost ethereal quality. Though Portuguese baroque is of a high standard, it never attained the quality of Manueline, and later Portuguese art was generally inferior. In the twentieth century, official government encouragement has been given to native artists and architects, and many of the characteristics of the Manueline style have been incorporated into modern buildings.

Music.—P. is noted for its folk music, though it was not until the nineteenth century that musicians began to incorporate folk-themes into their work. This folk-music shows Moorish and troubadour influences. Portuguese music otherwise tended to be modelled on Sp. forms. Among composers inspired by their native music may be mentioned Luiz Freitas Branco, Viana da Motta, and Rui Coelho.

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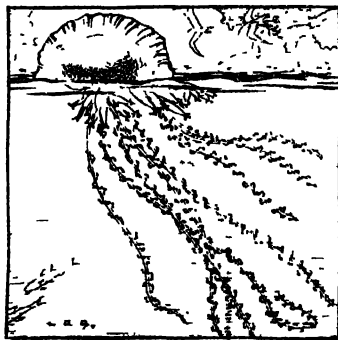
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Portuguese East Africa, see MOZAMBIQUE.

Portuguesa, state of W. central Venezuela, N. of Zamora, named after the riv. of the same name. It is an agric. state, sugar, coffee, maize, and cocon being the chief products. Guanare is the cap. Pop. 87,200.

Portuguese Guinea, colony of Portugal, on the coast of Senegambia, W. Africa, comprising the Bisagos Is., in the Atlantic. It has an area of 11,300 sq. m. Balamã is the cap.; Bissau is the chief port. The chief exports are ivory, palm oil nuts, rubber, rice, and wax. Pop. 351,000.

Portuguese India, three dependencies of Goa (q.v.), on the Malabar coast; Damão, on the coast 100 m. N. of Bombay; and Diu (q.v.), a small is., about 130 m. W. of Damão. Goa, or Pungim, is the cap. There are manganese deposits near Mormugão. Fish, salt, coco-nuts, and copra are exported. Area 1537 sq. m. Pop. 625,000.



PORTUGUESE MAN-OF-WAR

Portuguese Man-of-War, name given to the species of *Physalia*, a genus of Hydrozoa, or jelly fish, remarkable on account of their brilliant colours, size, and the severity of the pain its members are capable of inflicting on the human skin. Portuguese West Africa, see ANGOLA.

Portus Plendum, see under **SANTANDER**.
Port Wine, dark-red, full-bodied wine made in Portugal and exported from the tn. of Oporto, from which it takes its name. The grapes from which P. W. is made do not belong to any one variety, but the distinctiveness of the wine depends upon the climate and soil of the dist. and the methods of cultivation and vinification. The P. W. dist. is the Alto Douro, a region along the R. Douro, about 40 m. long and 10 m. wide. The dist. is very mountainous, and the soil, kept in place by stone-walled terraces, consists mainly of clay-schist and granitic material. The climate is extreme, hot summers alternating with cold winters, accompanied by heavy rains. For the most part the vines are allowed to grow quite close to the ground. The grapes are carried away in baskets, their stalks are removed, and the fruit trodden in large stone vessels for more than twenty-four hours. Fermentation is allowed to proceed to a certain extent in the stone vessels, the skins being trodden after an interval to procure the characteristic dark colour. The wine is then removed to vats and about 10 per cent of its volume of good brandy added. In the winter the wine is racked and more brandy added; another racking takes place in the spring, and the wine is stored in casks for export. The restricting of fermentation by the addition of brandy causes a large percentage of sugar (7 to 15 per cent) to remain in the wine, while there is usually from 18 to 22 per cent of alcohol. The development of the P. W. trade has been effected by means of Brit. capital, and for many years Great Britain received the greater part of the exported product.

Port Winston Churchill, name given to Arramanches, Normandy, where allied troops landed on June 6, 1944.

Porvoo, see **BORGÅ**.

Posadas, tn. of Argentine, cap. of the Misiones dist., on the Alto Paraná R., 700 m. from Buenos Aires. Yerba maté and tobacco are grown in the vicinity. Near by are the ruins of the old Jesuit missions, from which the prov. of Misiones derived its name. Pop. 40,000.

Poseidon, in Gk. mythology, god of the sea and son of Chronos and Rhea. He was identified by the Romans with their god Neptune. P. married Amphitrite, and had sway over the sea, the winds, and earthquakes, his symbol of power being a trident. His palace was at the bottom of the sea, near Argæ in Kuba, where he kept his chariot and his stud of horses. He built the walls of Troy, but, not being rewarded for his work, he showed implacable hatred towards the Trojans. He contended with Athens for Attica, and conspired against the sovereignty of Zeus.

Posidonius (c. 135-51 B.C.), Stoic philosopher, b. at Apamea in Syria. He was a pupil of Panætius. He travelled considerably, visiting Rome in 86 B.C., and was the teacher and friend of Cicero.

Posen, see **POZNAN**.

Posilipo, volcanic mt. to the N.W. of Naples, penetrated by the tunnel called

Grotto of P. (755 yds. long) connecting Naples with P. (anc. Puteoli), supposed to have been built during the Augustan period, and by the Grotto of Solanus (990 yds.), built by M. Cocceius Nerva in 37 B.C. at the command of Agrippa. In the vineyards near its entrance is the alleged tomb of Virgil.

Positive Rays were first discovered in 1886 by Goldstein during experiments with discharge tubes containing rarefied gases. He noticed that luminous streaks passed through holes in the cathode in the tube, and he named these streaks *Kanalstrahlen*. J. J. Thomson revealed the nature of these streaks, and finding them to consist of positively charged particles, he renamed them P. R. Thomson used a discharge tube with a perforated cathode, and the rays were made to pass through an electric field and a magnetic field successively. The fact that the rays were deflected in these fields proved that they consisted of charged particles; the direction of the deflection proved that the charges were positive, and measurements of the deflections produced by the electric and magnetic fields enabled Thomson to compute the ratio of the charge to the mass of the particle. He thus estab. the fact that the particles were ionized atoms, i.e. atoms minus one or more electrons, and as the electronic charge was known he was able to determine the mass of the atom in question. Subsequent experiments with an improved form of Thomson tube by Aston led to the important discovery that most chemical elements really consisted of a mixture of simpler elements. The simpler elements had identical chemical properties, and were named *isotopes*, but their atomic weights were different. Chlorine, for example, consists of two isotopes having atomic weights 35 and 37 respectively. Any sample of chlorine is made up from a mixture containing these isotopes in proportions that never vary, and the atomic weight of chlorine determined by chemical means is found to be 35.5. Aston's result has explained many anomalies in the periodic classification of the elements, and it has confirmed the hypothesis that all atoms are built up of the same bricks—electrons and protons. See J. Aston, *Isotopes* (2nd ed.), 1921. See also **ISOTOPE**.

Positivism, philosophical system which restricts itself to the data of experience, rejecting all *a priori* and metaphysical speculation. In the seventeenth century Hume confined himself to the sphere of observation. He considered causal relations as merely what experience has led man to expect. While not denying absolute reality he declared it outside the scope of his perfect system. The true founder of P., however, was Auguste Comte (q.v.), who owed much to Saint-Simon. P. starts from the assumption that knowledge is based solely on the methods and discoveries of physical science, and attempts the revaluation of social and moral values in the light of the exact sciences. Comte adopted a 'religion of humanity' akin to Nietzsche's idea of Superman, and proposed to dethrone the

gods of existing religious beliefs and raise the welfare of mankind as the object of worship. There exists a positivist church with ritual and organisation which has been aptly described by Huxley as Catholicism without Christianity. See A. Comte, *General View of Positivism* (trans.), 1908; G. Delermine, *J. Comte et son œuvre, le positivisme*, 1909; and H. Gouhier, *Jeunesse d'A. Comte et la formation du positivisme*, 1933-36.

Positivism, Logical, school of philosophy arising out of the work of Bertrand Russell. Its fundamental propositions, briefly stated, are three in number. Firstly, the meaning of any statement about the everyday world is the method by which its truth is verified through sensations; thus 'this is a picture' means that sensations of colour, hardness, coldness, etc., are being produced. Secondly, and following from the first, there is no meaning in theological or metaphysical statements, because these are *not* made about the world which is experienced by the senses. There can be no meaning in statements about the nature of God, because His existence cannot be verified by sense experience. Thirdly, and again following from the first, propositions concerning aesthetics or ethics e.g. that 'stealing is wrong' or that 'Keats's poetry is beautiful,' contain only the expression of a subjective emotion and do not say anything about the objects they purport to discuss, since 'poetry,' 'beauty,' 'evil,' etc., are not experienced by the senses. Though a movement of great influence, the doctrine has a profoundly destructive effect, since, if its propositions be granted, no theory about the nature of the universe can be offered. See A. J. Ayer, *Language, Truth, and Logic*, 1936, 1946, and C. E. M. Joad, *A Critique of Logical Positivism*, 1950.

Posology (*ποσος*, how much, *λογος*, science) science of quantity. The term was used by Jeremy Bentham in his system of classification of sciences. The science of the body, somatology, was divided by him into P., the science of quantity (i.e. mathematics), and polology, the science of quality. The modern use of the term P. is now confined to medicine, particularly homoeopathy, where it means theory of dose. In the decimal system, the pure substance or pure tincture is denoted by ϕ . To make the first decimal dilution ten grains of the substance are mixed with ninety grains of sugar of milk, or ten drops of the mother tincture with ninety drops of alcohol. The second decimal dilution, or 2X potency, is made by mixing ten parts of the first dilution with ninety parts of sugar of milk or alcohol, and so on. A centesimal system is also worked, the ratio of successive potencies being 1:100. Both systems of P. are associated with various branches of homoeopathy.

Posse Comitatus (power of the co.). 'Raising the P. C.' is an ancient common law power inherent in any justice of the peace or sheriff to take of the co. any number of persons he deems necessary to accompany him in the pursuit, arrest, and imprisonment of traitors, felons, and

breakers of the peace. According to Blackstone everyone over fifteen years of age and under the grade of a peer is bound under pain of fine and imprisonment to obey the order. The power is never exercised at the present day.

Possession. It is safe to say that the whole field of legal theory contains no conception that has given rise to such difficulties as that of P. These difficulties are not merely academic, for the legal consequences of the acquisition and loss of P. are of great practical importance. Corporeal P., i.e. the P. of a material object, is defined by Salmond as the continuing exercise of a claim to the exclusive use of it. The subjective element consists in the intention (*animus possidendi*) to appropriate to oneself the exclusive use of the thing; the physical or objective, in the external facts which effectively realise or embody the intention. This realisation is derived as a rule from one or more of the following sources: (1) The physical power of the possessor; (2) the personal presence of the possessor; (3) secrecy; (4) custom; (5) respect for rightful claim, and (6) the manifestation, by entry, apprehension, and actual use, of the *animus domini* (intention to own). Incorporeal P., if it can be said to amount to P. at all, is the P. of any non-material object, e.g. a right to light or any other easement (*q.r.*) (see also INCORPORA, HEREDITAMENT; PRESCRIPTION). Physically, as no mere claim to exclusive use can be effective, it is essential in the case of incorporeal P. that the possessor exercise his P. by *continuous* use and enjoyment. On the whole, the authorities concur in calling corporeal P. the P. of a *thing*, incorporeal the P. of a *right*. In both civil and criminal law it is often of vital importance to distinguish P. from ownership, e.g. to differentiate larceny (*q.r.*) from false pretences (*q.r.*). Inhering's statement of the relation between P. and ownership may be adopted, viz. 'Possession is the objective realisation of ownership,' i.e. P. is in *fact* what ownership (Rom. *dominium*) is in *right*, or, in other words, 'Possession is the *de facto* exercise of a claim: ownership is the *de jure* recognition of one' (Salmond). A number of important consequences flow from P., e.g. it is evidence of ownership, and the possessor can put all other claimants to proof of their alleged titles (i.e. it is the proverbial nine points of the law); long P. in certain circumstances gives a complete title even as against the true owner (see PRESCRIPTION; LIMITATIONS, STATUTES OF); ownership may be transferred by mere transfer of P., e.g. in the case of certain negotiable instruments; a possessor having no title may often confer a good title on another, e.g. if a thief pays another man for goods with stolen coin. It may be noted that a widely accepted theory of P. is that of the celebrated jurist Savigny, to the effect that the essence of corporeal P. is the physical power of exclusion; but that, while at the commencement of P. present or actual physical power of using a thing oneself is requisite, mere ability to reproduce such

power at will is sufficient for the retention of P. once acquired. Salmond asks, 'What physical power of preventing trespass does a man acquire by making an entry upon an estate which may be some square miles in extent?' It is clear that in a civilised community physical force is only an alternative element in P., and that by no means the most important. The whole theory, indeed, has been attacked by Savigny's equally celebrated opponent, Ihering, in *Grund des Besitzes*. A great deal of gratuitous difficulty arises from confusing the physical power of the individual and the active or dormant physical force of the state, the one element being important in some cases, while in others, e.g. P. of land, the force of the state is the real guarantee of occupancy.

**Possession, Demoniatic, see DEMON-
OLOGY.**

Posset, hot drink of curdled milk, usually taken at bed time, to cure a cold or cough. The milk is boiled and curdled by the addition of some acid, such as wine, ale, sherry, vinegar, or lemon juice, and sweetened with treacle.

**Postage Stamp Collecting, see PHIL-
ATELY.**

Postage Stamp, distinctive adhesive labels applied to letters, parcels, etc., handed to the post office for transit, and placed on the sev. packages, as a receipt for money prepaid for their carriage. Prior to the introduction of the penny post, as represented by the first adhesive P. S., the 1d. black and 2d. blue of 1840, Brit. postal rates depended on the distance a letter was carried, together with very stringent rules as to contents and weight. While a letter posted in London to a London address cost 2d., the fee rose by progressive stages, so that if it were carried for 20 m. it amounted to 6d. To take advantage of this rate a letter had to consist of only one sheet; if two sheets were used the rate was doubled, and if the letter weighed as much as 2 oz. the fee was seven times the minimum. These exorbitant charges greatly curtailed correspondence, and Rowland Hill believed that if the rate were lowered to a uniform charge of one penny for a letter of reasonable weight and the service reorganised (made possible by the coming of the railways) the increase in the use of the post would be so enormous as to justify fully such a drastic innovation. In 1837 he wrote a pamphlet entitled *Post Office Reform: its Importance and Practicability*, and gradually, with the help of James Chalmers, who submitted specimen stamps to him in 1838, persuaded the gov., who sponsored the necessary legislation. A public competition was held to decide the design of the proposed stamps, but though sev. thousand entries were received and four prizes awarded, yet the actual design settled upon, which was the joint work of Rowland Hill, Charles and Frederick Heath, Wm. Wyon, and Henry Corbould, was not one of those submitted. The profile of Queen Victoria, which forms the centre of the stamps, was taken from

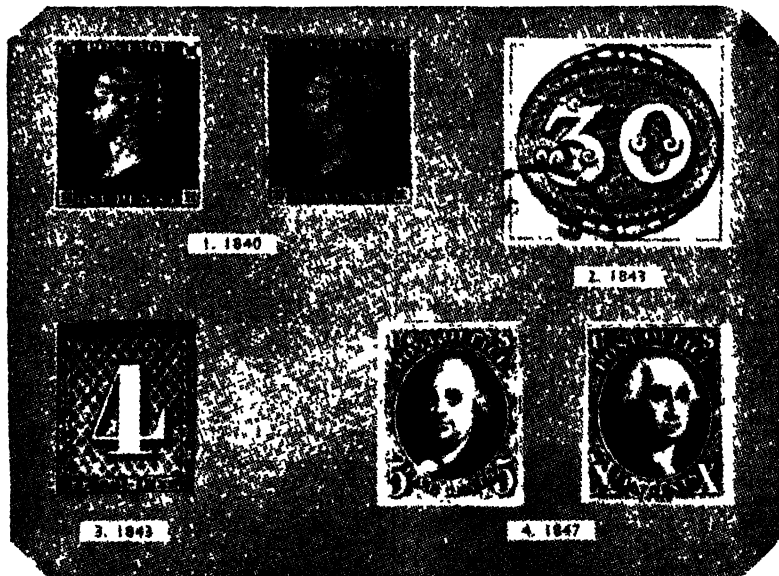
a medallion of Wyon's struck in 1837 and resketched by Corbould.

The first adhesive P. S. ever to be issued in any country (originally they were called 'labels' and the gum 'cement'), 1d. black and 2d. blue, were put on sale on May 6, 1840, and despite much opposition and ridicule fulfilled, within a few years, Hill's greatest expectations. These two stamps, which for seven years were the only ones available in Great Britain (similarly, the first Federal stamps issued in the U.S.A., the 5 cents and 10 cents of 1847, sufficed America for four years), were line-engraved by Frederick Heath and printed by the firm of Perkins, Bacon, & Petch on paper, watermarked with a small crown, made by the firm of Stacey Wise. The 1s. stamp of 1847 was issued to meet the postal rate to the U.S.A. and some of the outlying colonies, being also the rate fixed for inland registration; the 10d. stamp of 1848 to meet the postal rate to France and some of the nearer colonies; the 6d. stamp of 1854 to meet the postal rate to Belgium and some other European countries. Soon afterwards postal rates for abroad began to fall; the 1d. stamp of 1855 represented the revised rate to France, the 3d. stamp of 1862 the revised rate to Belgium and Switzerland, the 9d. stamp of 1862 the revised rate to India, Australia, and Brazil. At one time or another Great Britain has issued stamps of the following values: 3d., 1d., 1½d., 2d., 2½d., 3d., 4d., 4½d., 5d., 6d., 7d., 8d., 9d., 10d., 11d., 12d., 2s., 2s. 6d., 5s., 10s., £1, and £5. All these stamps were produced to fulfil specific needs, particularly as, for many years past, stamps have been valid for revenue as well as postal purposes. At one period, though this custom has long since been given up, current stamps were over-printed with the names and for the use of certain gov. depts.: Inland Revenue, Office of Works, Army, Admiralty, Board of Education, Gov. Parcels, and Royal Household. The first official stamp of this nature was a variant of the original black 1d. In the top corners of which the initials 'V R' replaced the Maltese cross of the normal stamp. This official stamp, however, though printed, was never put into service. The first 1d. stamp was printed from twelve different plates and the 2d. stamp from two different plates. In 1841 the colour of the 1d. stamp was changed to red, many new plates being added, and in the same year the 2d. stamp had a white line drawn on the design above and below the head and was reprinted in a different type of ink. One new plate was added.

The reason for both these changes was the fear that unscrupulous persons would delete the postmark (for years the post office experimented, earnestly but inconclusively, with a cancellation ink that could not be removed) and thus be able to use stamps a second time. The black of the 1d. had made postmarks difficult to distinguish, while the ink used in the printing of the first 2d., unlike the ink used in the printing of the second, was not fugitive and thus did not reveal the

effects of erasure. Another method of defrauding the post office was to cut off the upper and lower portions of two stamps where the postmark did not show and to join these halves together so as to form an apparently unused stamp. This was met in 1858 by fitting the check letters on the stamps, which had hitherto filled only the two bottom corners, into all four corners: thus 'A B—B A.' As these check letters ran almost through

may be said with assurance that the danger has been largely eliminated. Only one Brit. stamp, the 1s. of 1872, has been forged for the purpose of defrauding the post office. This stamp was used mainly in the London Stock Exchange for brokers sending telegrams to their clients, and it was a clerk in the telegraph office there who perpetrated the forgery, which was not discovered till 1898, when he was already dead.



POSTAGE STAMPS: SOME FIRST ISSUES

1. 1840 *Great Britain*. The 1d. and 2d. of 1840 were the first two postage stamps ever issued.
2. 1843 *Brazil*. The first country to follow Great Britain's lead and issue postage stamps. The issue of 1843 consisted of three values: 30 reis, 60 reis, and 90 reis.
3. 1843 *Zurich*. This is a local stamp issued by the Swiss canton. The issue consisted of two stamps: 4 rappen and 6 rappen. Later in the same year Geneva also issued a stamp.
4. 1847 *United States of America*. These are the first two Federal postage stamps issued, though several cities had issued local stamps as early as 1845.

By courtesy of Frank Godden Ltd.

the alphabet, each stamp on the sheet of 240 exhibiting a different combination, the chance of two stamps being found with the same check letters was remote. Many other efforts were made, both in Britain and elsewhere, to counteract possible attempts at cheating, and in the sixties and seventies of the nineteenth century the U.S.A. even imposed a 'grill,' a mark like a hairrow, upon its stamps, in order to break up the ink of the postmark and render its removal impossible. But since the introduction of chalk-surfaced paper at the end of the nineteenth century, tampering with stamps has become much more hazardous, and though post offices never relax their vigilance, it

Up till 1854, when Henry Archer's many years of experimenting with a perforating machine were finally successful, and his machine was adopted by the post office, stamps were issued imperforate and had to be cut from the sheet as required. This was a laborious process, and next to the invention of adhesive P. S., it is probable that Archer's invention has done more to popularise the use of the post than anything else. The lead given by Great Britain in inaugurating adhesive P. S. was followed within a few years. The following countries, up to 1850, took advantage of the new system: 1843: Brazil (July); 1847: U.S.A. (Aug.); (from 1845 some cities in the

U.S.A. had issued local stamps), Mauritius (Sept.); 1849: Franco (Jan.), Belgium (July), Bavaria (Nov.); 1850: New S. Wales (Jan.), Spain (Jan.), Victoria (Jan.), Switzerland (April) (two of the Swiss cantons had issued local stamps in 1843 and one in 1845), Austria (June), Brit. Guiana (July), Saxony (July), Prussia (Nov.), Schleswig-Holstein (Nov.), Hanover (Dec.). By 1849 there was no state of any importance that had not its postal system and its P. S. The effect of the two world wars has been to create numerous new stamp-issuing states, but in the course of the P. S. more than one hundred years of existence many states that once issued stamps have ceased to function as separate entities.

The actual printing of stamps has undergone many changes and modifications. Some early stamps were hand-set, some (including three Brit. stamps) were embossed; many have been line-engraved and many have been lithographed. But the most general systems in vogue in later times have been surface printing, recess printing, and photogravure printing from cylinders. This last, especially, makes for combined speed, cheapness, and accuracy, but the stamps produced, though excellent examples of mass workmanship, cannot compare in beauty or dignity with the original line-engraved stamps printed on steel. The most famous firms of Brit. printers of stamps have been Perkins, Bacon & Petch, De la Rue, Waterlow, Nissen & Parker, Bradbury, Wilkinson & Company, Harrison and Sons, and Somerset House, where the post office printed certain issues.

In the production of the world's P. S. many different kinds of paper have been used, though by far the commonest are 'wove' and 'laid,' which may briefly be differentiated by the fact that wove paper has no lines in it, and laid paper has lines, although there are countless varieties of both. Many types of watermark have also been used, and though watermarking stamp paper is not a universal rule, every Brit. stamp, with the exception of the 1s. of 1847 and the 10d. of 1848, has been printed on watermarked paper, of which over twenty varieties have been employed. Again, many sizes of gauge and types of perforation have been tried and even various qualities of gum, though it should be mentioned that, just as early stamps were imperforate, some early stamps were ungummed. Monocoloured stamps are usually, though not invariably, printed from a single plate; but when the centre of a stamp has a different colour from the surrounding frame it has to be printed from two plates, and it sometimes happens that one of them gets reversed. As for the shape of stamps, although there have been many divergences from the normal, such as the triangular shape of the early Cape of Good Hope stamps and the large size of some Brit. commemorative stamps, the fact remains that the size and shape of the very first P. S. set a fashion which has survived to this day.

As international postage increased in

volume, many problems arose. A letter posted in one country, which had to pass through one or more other countries before reaching the country of destination, was subject to postal dues in any countries through which it passed. This led to a complicated system of international book-keeping and caused much inconvenience. However, this and other difficulties were smoothed out by the creation of the Universal Postal Union in 1874. A reciprocal arrangement was come to whereby only the country in which a letter was posted charged a fee for its carriage. Thus every country benefited roughly as much as it lost and the labour of keeping accounts was abolished. One of the early innovations agreed to by the Universal Postal Union, which, from 1875, held triennial meetings, was that low face-value stamps of approximately the same value should, in every member country, be printed in the same colour, thus facilitating the work of post offices throughout the world. This arrangement lasted for many years, but with the collapse of currencies and the fluctuating rates of exchange it became somewhat modified. Owing to rising costs and need for revenue, the basic penny rate for inland letters in Britain which had existed unaltered from 1840 to 1916 was finally abandoned. In the latter year it was increased to 1½d., raised to 2d., in 1920, lowered again to 1½d. in 1922, and in 1940 raised to 2½d., where it now (1950) stands. See also PHILATELY. See It. P. Croom-Johnson, *Postage Stamp Collecting*, 1923; It. Lowe (ed.), *Empire Postage Stamps*, 1937; chapters in L. N. and W. Williams, *Philately*, 1939; J. Easton, *British Postage Stamp Design*, 1943, and *Postage Stamps in the Making*, 1949; and R. Curle, *Stamp collecting: a New Handbook*, 1946.

Postern, or Sallyport, small gate in a medieval castle defended by a portcullis. It was used for the entrance and exit of secret messengers, or sorties.

Posters. A roll of twenty-three prehistoric P., alleged by Egyptologists to date back to the period of Dynasty VI, was found among the sarcophagi of the ruined pyramids of Sakkarah, Egypt. But the pictorial poster is essentially modern, and is but little older than the middle of the nineteenth century. Jules Chéret is generally regarded as the father of pictorial P., the idea of which was quickly adopted in Great Britain and America. But Eng. pictorial P. prior to 1871 exhibited hardly any of the artistic merit that characterised the Fr. P. of Gavarni, though brave attempts were made by Godfrey Durand in a poster announcing the then newly pub. *Graphic*, and Walter Crane in a poster advertising a make of lead pencils. In 1871 Fred Walker designed his celebrated poster (now in the Tate Gallery) to advertise Wilkie Collins's dramatized version of *The Woman in White*, which was being produced at the Olympic Theatre in that year. Since that time many R.A.s and other notable artists have entered this particular field of activity, and it is hardly necessary to mention the coup of

T. J. Barratt, who secured the beautiful picture of 'Bubbles' by Sir John Millais to advertise Pears' soap. Aubrey Beardsley introduced the curious flat poster, uniform in colour and setting the fashion in oriental lack of perspective. After him came the Dudley Hardy school of designs—bold in outline, arresting in subject-matter; while among other later artists of note in poster painting are Fred Hassall with his comic P., Hilda Cowham with her felicitous adaptation of child-studies, E. McKnight Kauffer, who produces striking landscapes in three or four boldly handled colours, and A. R. Thompson, whose *Street Markets* (1949) has pointed to a school of future P. in which boldness of outline is not incompatible with a wealth of detail.

The London Co. Council have passed a by-law prohibiting the exhibition of any pictorial poster where such poster may disfigure a highway, landscape, place of natural beauty, or public pleasure-ground. Bill-posting generally has become so important a factor in the business life of the nation that there exist societies like the London Billposters' Protection Association and the Billposting Contractors for the protection and advancement of the general interests of the bill-posting trade. The first-named society exercises through its censorship committee a healthy supervision over P. generally, though that body and the London Co. Council do not always concur in what is desirable and what is not. An attack on advertisement by P. was made in 1913 by the Bill for the Regulation of Advertising, which proposed unsuccessfully to empower every local authority to prescribe the shape and colour of P. in its own area. In the period between the outbreak of the First World War and the introduction of conscription successful use of P. was made for recruiting purposes, the 'Kitchener poster' being famous. After the armistice the newspaper advertisement columns were filled at a quicker rate than the poster hoarding, and it seemed for a time as if the advertiser had less faith in the value of this medium. But by 1930 good hoardings were at a premium, the chief competitors for space appearing to be the cinematograph theatres and breweries. A successful poster campaign was that of the Empire Marketing Board (*q.v.*), the purpose of which was to induce people in Britain to purchase empire goods. Among advances in poster art after 1920 the P. displayed by the main-line railway companies have been outstanding, while those of the Underground Railway won recognition not so much on account of some outstanding specimens of artistic merit as for boldness and originality displayed in the use of small space, and some commercial firms have produced outstandingly impressive or comic P., such as Shell-Mex and Guinness. During the Second World War the art of P. was brought almost to a standstill, except for those issued by the gov., because of the paper shortage. After the end of the Second World War the reappearance

on a large scale of commercial P. has shown that the artistic consciousness which was being developed in poster art before 1939 has not been lost. In 1949 an exhibition of London Transport P. was held at the Victoria and Albert Museum, London. See also ADVERTISING. See C. Hatt, *Pictorial Posters*, 1895; and E. McKnight Kauffer, *The Art of the Poster*, 1921, *Studio Special Number: Posters and Publicity*, 1926, and *Commercial Art Annual: Posters and Publicity*, 1927.

Post-Impressionism, movement in painting which followed on Impressionism. P.-I. was a return to the classical and architectural in painting, and the movement started in France towards the end of the nineteenth century with the paintings of Cézanne and Seurat. Architectural form is the criterion of P.-I., while other points in Post-Impressionist technique are a perception of formal relations revealed in painting and the ability of the painter, if necessary, to dispense with representational details and to break away from the camera vision.

P.-I. as a whole is not naturalistic painting, and Cézanne, its greatest exponent, introduced perspective into his work by the use of tone and colour. Van Gogh, Gauguin, and Renoir followed the movement to a certain extent, but each possessed individual qualities of painting that prevented them from being true Post-Impressionists. Cézanne, Matisse, and Picasso afterwards carried the movement further. P.-I. did not reach England until 1910, when the first exhibition was held in London. The Eng. painters Paul Nash and Duncan Grant may be termed Post-Impressionist painters. P.-I. declined with the development of Cubism.

Postliminium (Rom. law, *post*, after; *limen*, threshold), term adopted in modern international law from the *jus postliminii* of Rom. law to indicate the fact that *ter.*, individuals, and property, after having come in time of war under the power of an enemy, return either during the war or on its termination under the power of their original nation. This may happen by reason of evacuation of *ter.* by the enemy, reconquest by the former owner, reconquest by a third nation followed by restoration to the former owner, or restoration by the terms of a treaty of peace. Strictly the title of P. is unnecessary to describe an obvious state of facts, and, indeed, the real difficulty in P. cases is to determine the validity or otherwise of acts done in relation to vested property during its ownership by an enemy. Again, other liabilities may arise, *e.g.* if a ship has been captured and is recaptured, P. reverts the ship only in the original owner, subject to the obligation to pay salvage. Most modern international lawyers restrict P. to *ter.* and ships, and apply the principle of P. to movables only if they be promptly recaptured.

Post Mills, see under WINDMILLS.

Post-mortem Examination. When a coroner issues a summons to a medical practitioner to attend and give evidence as to how a deceased person met his death, he may, either in the summons or at any

time down to the end of the inquest, direct the practitioner to make a P. E. of the body of the deceased either with or without an analysis of the contents of the stomach or intestines. Frequently the practitioner who attended the deceased at his death is called upon to make the examination, but if evidence is given at the inquest to the effect that the death was caused by the improper or negligent treatment of a practitioner, that practitioner may not be permitted to perform or assist the P. E. By the Coroners Act, 1887, a coroner's jury, if not satisfied by the evidence brought before it, may require the coroner to summon some other medical practitioner named by it, and to direct the practitioner so summoned to make a P. E., whether an examination has been previously made or not. A P. E. is necessary only where it appears either to the coroner or the jury that it will explain the cause of death. See CORONER.

Post-nuptial Settlement, see SETTLEMENT.

Post-obit Bond, bond given to secure the repayment of a loan on the death of some specified person from whom the borrower has expectations.

Post Office. It is often said that in England prior to the seventeenth century nothing is heard of a P. O., and in the modern sense of that term as denoting a gov. dept. possessing a monopoly as to carriage of letters, the statement is true. But correspondence between subjects, as distinct from communications between states, must have existed from the earliest times, and the only difficulty, if any, is to determine the precise mode of transmission before the state couriers both in England and in other countries were permitted to carry such correspondence along with public dispatches. The Close and Mesne Rolls, the wardrobe accounts of the kings of England, royal proclamations, and other records afford ample evidence of a regular if rudimentary postal system for royal correspondence. The expenses of the estab. of *nunci* entrusted with the conveyance of letters formed a large item in the charges of the royal household as early as the middle of the thirteenth century, and these payments, which will be found enrolled on the Close and Mesne Rolls, may be traced in an almost unbroken series through the records of reigns subsequent to that of King John. The method of transmission was by relays of men and horses maintained under the superintendence of some gov. official. Herodotus describes a similar means of communication in vogue with the anc. Persians, and it can hardly be doubted that the Rom. practice of transmission by *tabellarii* (from the *tabella*, or waxen tablets, on which the *epistolæ* were inscribed), as described by Festus and by St. Jerome, was closely analogous. Whatever the precise manner of evolution, however, it is clear that by 1548 the transmission of the private correspondence of the subject by post-horses had become a common practice, for a statute of that year fixed a penny a m. as the rate of hire. Camden mentions Thomas Randolph as

the chief postmaster of England in 1581, but this office would seem to have existed at least as early as the reign of Henry VIII. What the duties were is not clear, as the earliest recitals of the duties and privileges appertaining to the office occur in the reign of James I., which monarch, according to the letters patent of Charles I., constituted an office called the office of postmaster of England 'for foreign parts being out of his dominions.' James I., however, went further than this, for according to Kennedy's *Annals of Aberdeen*, he introduced improvements in the postal system upon the lines suggested by the methods in vogue in various Scottish tns. From all accounts it seems that we owe the amelioration of the service as it existed in the early part of the seventeenth century to the necessity for a better means of communication between England and Scotland, a conjecture borne out by sev. proclamations, especially one of 1635, which was made 'for settling of the letter-office of England and Scotland.' That proclamation recites 'that there hath been no certain or constant intercourse between the kingdoms of England and Scotland,' and commands 'Thomas Witherings, Esq., his Majesty's postmaster of England for foreign parts, to settle a running post or two, to run night and day between Edinburgh and Scotland and the City of London, to go thither and come back in six days'; and directions are given for the management of the correspondence between post-tns. on the line of the road and other named tns., and similarly in Ireland.

In 1649 the Common Council of London endeavoured to inaugurate a separate P. O., but was thwarted by a resolution of the Commons, which declared the office of postmaster to be in the sole power and disposal of Parliament. Throughout the earlier part of the Stuart period constant attempts were made by private individuals to break the royal monopoly, but they were one and all unsuccessful. The only class of persons, indeed, that ever seems to have been favoured with the right to send its own letters by its own service was the mercantile community, but except as to the Company of Merchant Adventurers the privilege was speedily revoked. During the Commonwealth the postal service was farmed out by the Commons at a rent of £10,000 a year to one John Manley (later, for £21,500 annually, to the duke of York), apparently as the easiest way out of the difficulty arising from the fact that the earlier Stuarts had granted sev. patents to different individuals, with the result that conflicting and concurrent claims were put forward. The latter half of the seventeenth century saw considerable advances in the estab. of a P. O., advances which were probably hastened by the public-spirited agitation for reform by John Hill, a Yorkshire attorney who, considering the g. monopoly to farmers to be an infringement of the liberty of the subject, organised a postal service at half the gov. farmers' rates, and nearly lost his life for his audacity. The gov. intended at all costs to keep the monopoly because

it was a source of revenue and because it enabled them by a system of espionage to control the political agitator at home and abroad. The gov. still possesses limited powers of espionage, but its unfettered liberty in that respect was curtailed as a result of the indignation roused by the opening of the letters of the celebrated refugee Mazzini.

In 1656 an Act was passed to establish one general P. O., and one officer, to be styled the postmaster-general of England and comptroller of the P. O. This officer was to have the horsing of all 'through' posts and persons 'riding in posts'.

escorts and so constructed as to nullify as far as possible the attentions of the omnipresent highwayman, and the development of the packet system, especially through the advances made in steam navigation.

Rowland Hill, arguing from the unprogressive rate of revenue from the postal service, and the fact that the charge of postage altogether exceeded the actual cost of receipt, delivery, and transit, advocated, in his pamphlet *Post Office Reform*, the estab. of a uniform penny postage throughout the kingdom, as the only alternative to the impossibility of



Postmaster General

THE ROYAL MAIL COACH, LONDON TO GLASGOW 1840

Engraving by F. W. Hoppam after a painting by J. L. Herd and Senior

Prices for letters, whether Eng., Scottish, Irish, or foreign, and for post horses, were fixed. All other persons whatsoever were forbidden to 'set up or employ any foot, posts, horse-posts, or packet boats'. In 1683 a metropolitan penny post was instituted by the celebrated Wm. Dockwra, who carried and insured letters and parcels up to £10 in value and a pound in weight for one penny. He naturally excited the fury of the farmers by his enterprise and involved himself in litigation, the ultimate consequence of which was that his penny post became a part of the General Post Office (G. P. O.), and he himself, as a solatium, was appointed comptroller of the London office. The prin. reforms from that time down to the measures of Sir Rowland Hill were the invention by Allen of the cross-road postal system, Palmer's mail-coaches, these latter being accompanied by armed

collecting what he estimated to be the average cost of postage of a single letter, namely, something less than one tenth of a penny. His proposals met with ridicule from more or less interested quarters, but public agitation called for the appointment of a select committee of inquiry into the whole economical aspect of P. O. charges. The result was the Act of 1839, which enabled the Treasury to establish a uniform penny rate for the whole of the United Kingdom, the scale of weight being 1d. per half ounce, or 2d. per ounce, all fractions of an ounce above the first being reckoned as an ounce. Postage stamps (q. 1) were introduced in place of the old method of payment in advance, shortly afterwards. The success of Hill's scheme, in the teeth of prejudice both inside the P. O. and in gov. circles, is sufficiently proved by the fact that the number of letters carried rose from 1,585,973 for the

week ending Nov. 24, 1839, immediately prior to the scheme being put into execution, to 6,849,196 for the week ending Feb. 21, 1840, and the net revenue in the space of twenty years yearly reached the figure. It stood at in 1838, namely £1,676,592, and in 1930 at nearly £27,000,000. This rise in net revenue was certainly not striking for the first thirty years, but it is to be remembered that the old charges were in the highest degree exorbitant (9d. a letter being an average charge for transmission outside London), and further, that the profits of the P. O. were burdened with the payment of certain large pensions. Since Hill's time the most notable features of the hist. of the P. O. have been the estab. of the parcel post (aimed at the excessive charges of railway companies), the institution of the P. O. savings bank, the transfer to the state of the telegraph and telephone services, the introduction of post cards and letter cards, the extension of the penny post throughout the Brit. dominions (though originating as a measure to increase revenue during the First World War this rate gave place to 1½d., rising to 2½d during the Second World War).

STAFF AND ORGANISATION.—The ministerial head of the P. O. is the postmaster-general, who is responsible to Parliament for the conduct of the affairs of his dept.; his chief adviser is the director-general, who is the permanent head of the dept. The headquarters of the P. O. are in the city of London on a site long associated with P. O. work. Under the director-general the work of the administration is divided into four main depts.: (1) The personnel dept., which deals with matters affecting staff and accommodation. (2) The postal services dept., where policy relating to home and overseas mail services is decided. (3) The telecommunications depts. (inland and overseas) for the settlement of matters relating to telephone, telegraph, and wireless. (4) The public relations dept., acting as liaison between the P. O. and the general public. These depts. are staffed mainly by what are known as the Treasury classes (the general civil service clerical, executive, and administrative grades) but there are in addition many specialist P. O. grades. With their separate headquarters in London are the main depts. which control the working of the services within their respective spheres. These are the accountant-general's dept., the engineering dept., the P. O. savings dept., and the supplies, contracts, factories, and solicitor's depts. To organise control effectively throughout the country and to provide local contact with P. O. administration, the country is divided into ten self-contained regions. Within a region all P. O. services are gathered under the control of the regional director, except that in London the postal and telecommunications sides are separated into two functional regions. Within the regional organisation the two main sides of the work—the telecommunications side and the postal side—are split up into smaller

geographical units under the control of telephone managers and head postmasters.

INLAND CORRESPONDENCE.—The principal features of the inland correspondence system are as follows:

Parcel Post.—The rates of postage on parcels are from 9d. for a parcel not exceeding 3 lb. in weight to 1s. 4d. for a parcel not exceeding 15 lb. (maximum) in weight. (The rates of postage for parcels to the Irish Republic are: not over 2 lb., 9d.; not over 5 lb., 1s.; not over 8 lb., 1s. 3d.; not over 11 lb. (maximum), 1s. 6d. The greatest length allowed is 3 ft. 6 in., and the greatest length and girth combined 6 ft. It is illegal to send by post any packet consisting of any indecent or obscene matter, any explosive or dangerous substance, any sharp instrument not properly protected, any deleterious or noxious substance, any article which may be a source of damage to other postal packets, and (except with the permission of the postmaster-general) any living creature. Prohibited articles, if detected, are liable to detention and the sender to prosecution. Perishables may only be sent by parcel post, and must be marked 'perishable'; they should be packed so as to prevent injury to other postal packets by contact.

Poste Restante.—This facility is provided solely for the convenience of travellers and it may not be used in the same tn. for more than three months. The words 'To be called for' or 'Poste restante' should appear in the address of such correspondence. When dispatched from abroad the limit of retention is one month; if posted in the United Kingdom a fortnight. Letters addressed to a P. O. at a seaport tn. for a person on board a ship expected at that port are kept two months. At the expiry of these periods postal packages are treated as undeliverable.

Registration.—Both letters and parcels can be registered, the ordinary fee, in addition to the postage, ranging from 4d. to 2s., with compensation of from £5 to £100. The packet should be marked in the bottom left-hand corner with the word 'Registered,' and if a higher fee than 4d. is paid, this should be shown, viz. 'Registered 5d.' Nothing intended for registration and marked 'Registered' must be dropped into a letter box, or it will be compulsorily registered. Correspondence can be registered at any time during the ordinary hours of business. The sender may arrange, for a fee of 3d. at the office of posting, for an advice of its delivery to be sent to him. Packets containing coin or jewellery, if posted otherwise than in accordance with the regulations, are compulsorily registered at a fee of 4d.

Cash on Delivery Service.—Packets or parcels up to the value of £40 may be posted at a money order P. O., when the value of the contents will be collected and remitted to the sender. When the value does not exceed £10, delivery is made by the postman in the ordinary way. When above that amount, the addressee is informed of its arrival at the P. O., and delivery is made upon receipt of payment.

The fees, which in addition to postage must be prepaid, are: value not exceeding 10s., 4d.; £1, 6d.; £2, 8d.

Express Delivery Service.—The three express delivery services are: (1) by special messenger all the way; (2) by special messenger after transmission by post; and (3) by special delivery in advance of the ordinary mail at the request of the addressee. The rate for the first service is 6d. for every mile or part of a mile, together with the cost of any necessary special conveyance in addition to the mileage fee. Money and jewellery may be conveyed under this service at the sender's risk without being registered. Packets for this service must be boldly and legibly marked 'Express' above the address in the left-hand corner of the cover and must be handed in at a P. O. The charge for the second service is normally 6d. in addition to the full ordinary postage, but where a special conveyance is indicated by the sender or is otherwise necessary, the actual cost is charged, or if that is not known, 1s. per mile. Packets for this service must be legibly marked 'Express' above the address on the left-hand side of the cover, and in the case of a letter the cover must also be marked with a broad blue or black perpendicular line from top to bottom, both on the front and back. The postage and charges should be prepaid by means of stamps affixed to the letter or parcel. The fee for the third service is the full express fee of 6d. a mile as for one packet, and a further fixed charge of 1d. for every ten or less number of additional packets beyond the first.

Railway Letters.—Under agreement with the P. O., Brit. Railways accept and convey letters by the next available train or ship, either to be called for at the station of address or to be transferred there to the post by railway officials. The following fees are payable, in addition to the normal postal charges: weight not over 2 oz., 5d.; over 2 oz. and not over 4 oz., 9d.; over 4 oz. and not over 1 lb., 1s. 2d.. Railway letters should be tendered by the sender to a railway servant in the parcel booking office or, if that office is closed, in the passenger booking office.

Air Mail Services. First-class mail (letters), letter packets, air letters, and postcards) and second-class mail (printed papers, commercial papers, samples, literature for the blind, and, in the case of those countries which accept them, small packets) may be sent by air mail to civilian addresses in many overseas countries; parcels may be sent by air to most destinations in Europe. Full particulars of these services and of the appropriate air postage rates are given in the air mail leaflet. This leaflet may be obtained at any P. O., or a standing order may be placed with the local head postmaster for new eds. of the leaflet to be supplied by post free of charge as and when pub.

TELEGRAPHS AND TELEPHONES: Telegrams.—Inland telegram service extends over Great Britain, N. Ireland, the Channel Is., and the Isle of Man, and

between these places and the Irish Republic. The charge is 1s. for nine words or less and 1d. a word thereafter, except in the case of telegrams to the Irish Republic when the minimum charge is 1s. 6d. for twelve words. The charge covers delivery within a tn., postal area, or within 3 m. of the telegraph office nearest the address, whichever is the greater. In the Irish Republic free delivery is restricted to addresses within 1 m. of the delivery office. The charge for delivery at any address beyond the limits of free delivery is at the rate of 6d. for each mile or fraction of a mile. Except as regards telegrams to destinations in the Irish Republic the charge is payable by the sender. Replies may be prepaid up to forty-five words (up to forty-eight words to addresses in the Irish Republic) and the reply-paid form is valid for twelve months, after which time the sender may recover the amount of the prepayment on production of the form.

Wireless Telegraphy.—The Marconi Company applied in 1910 for licences for eighteen wireless stations at various points in the Brit. Empire, the gov. to have a right to purchase at the end of twenty years. This offer was rejected by the gov. and the P. O. then proposed an agreement with the Marconi Company for a state-owned chain of stations (see parl. paper, July 19, 1912) in England, Egypt, S. Africa, India, Singapore, and the E. Africa Protectorate. The complete installation of these stations was, under this proposed agreement, to be the absolute property of the gov. But this proposed empire wireless chain did not materialise owing to the development of the short-wave directional system, commonly known as the Beam system. For this service the Marconi Company built a transmitting station at Bodmin and a receiving station at Bridgwater for communicating with S. Africa and Canada, and a transmitting station at Totnes near Grimsby, for communicating with India and Australia. When the stations were completed they were taken over and worked by the P. O. until 1929, when they were leased to Imperial and International Communications Ltd., who now carry on these services. The corresponding stations are at Cape Town, Halifax, Bombay, and Melbourne. P. O. coastal wireless stations provide short-range and world-wide radio-telegraph services with ships at sea. The standard rate of charge for a radiotelegram is 1s. a word.

Acceptance and Delivery of Telegrams by Telephone.—Telephone subscribers may telephone messages for onward transmission as telegrams to a telegraph office, and the public, generally, are at liberty to dictate telegrams from any telephone call office. Telephone subscribers can generally arrange with the P. O. to have their telegrams delivered by telephone instead of by messenger.

Night Telegraph Letter Service.—This service is at present (1930) suspended.

Telephones.—The whole of the local telephone system formerly owned and

worked by the National Telephone Company was in 1912 transferred to the P. O., which now controls the trunk and local telephone service throughout the United Kingdom (except in Kingston upon Hull where the local telephone service is controlled by the city corporation). The fees for calls of 3 min. duration within the Brit. telephone system are as follows: from midnight to 6.30 p.m. (call office and coin box lines midnight to 5.30 p.m.) and 9.30 to midnight, 15-20 m., 10d.; 25 m., 1s. 2d.; 35 m., 1s. 6d.; 50 m., 1s. 10d.; 75 m., 2s. 3d.; 125 m., 3s.; over 125 m., 3s. 9d. Between 6.30 p.m. and 9.30 p.m. (call offices and subscribers' coin box lines 5.30 p.m.-9.30 p.m.) a lower scale of charges operates. Calls may be made to specified persons for a small additional charge which is the same whatever the distance or duration of the call. Telephone communication is obtainable (1950) with all countries in Europe, except Albania, and by radio-telephone with most of the other countries of the world, coasting and short-voyage ships, and certain ocean liners.

The development of wireless telephony commenced with the opening in Jan. 1927 of a wireless telephone service between the United Kingdom and the U.S.A. There are now sev. transmitting and receiving stations in the United Kingdom and the service is carried out by both long- and short-wave circuits.

It is interesting to note that the land-line services with the Continent are linked up with the services carried out by wireless through the P. O. wireless stations. Thus, for instance, a subscriber in Oslo wishing to speak to a subscriber in Bombay would be linked up by land line to London, then by wireless from Rugby to Poona, and then by land to Bombay.

TRANSMISSION OF MONEY BY POST: Money Orders.—The money order service is intended primarily for the transmission of small sums throughout Great Britain (including the Channel Is. and the Isle of Man), N. Ireland, the Irish Republic, and to certain places abroad.

Inland Money Orders.—A money order for payment in Great Britain and N. Ireland may be obtained for any amount not exceeding £50, but for an order payable in the Irish Republic (which is also included in the inland service) the limit is £40. Fractions of a penny are not allowed. The intending purchaser is supplied with a requisition form on which, in addition to his own name and address, he should enter the surname and, if known, at least the initial of one Christian name of the payee, and the name of the office of payment if payment is required at a P. O. If payment is required through a bank, this must be indicated. When issued, the money order, with a counterfoil attached, is handed to the remitter so that the order may be sent to the payee and the counterfoil retained for reference purposes. If the order is to be paid at a P. O., an advice, containing information as to the amount of the order and as to the names of the payee and remitter, is forwarded by the issuing postmaster to the

office of payment and before payment is effected the payee must sign the order in accordance with the name given in the advice and must furnish the name of the remitter correctly.

Inland Telegraph Money Orders.—An inland money order may be transmitted to the payee by telegraph and this facility is available at most money order P. Os. from which telegrams are dispatched. A form of requisition must be completed by the purchaser as for an ordinary inland money order and, in addition, the words 'By Telegraph' and the address of the payee must be entered. A certificate of issue is handed to the purchaser as a record of the transaction. Money orders are not negotiable, and after an order has been paid the P. O. is not liable to meet any further claim in respect of it.

Overseas Money Orders (Ordinary and Telegraph).—These are available to certain places only. For most parts of the Brit. Commonwealth the service is free from restrictions and the maximum amount of an order is £10. For Canada and most foreign countries the service is subject to strict Treasury control, and can only be used for certain purposes, and is subject to a maximum of £10. Permission to send to any of these countries has to be obtained from the accountant-general's dept. (G.P.O.) on a declaration form obtainable at any money order P. O. before an order can be purchased. A requisition form for an overseas money order must be completed in the same way as for an inland order but, in addition, the full address of the payee must be stated. If the order is to be sent by telegraph the words 'By Telegraph' should be written across the requisition form. Telegraph orders payable overseas may not be crossed for payment through a bank, and this also applies to ordinary orders payable in foreign countries and in some Brit. Commonwealth countries. A certificate of issue is handed to the purchaser for retention as a receipt, and payment is arranged by means of a document prepared in the country of payment.

Stoppage of Payment (inland and overseas order).—Payment of an ordinary money order may be stopped. A fee of 4d. is charged for this service, application for which should be made, preferably on the form provided for the purpose and obtainable at any money order P. O.

Postal Orders.—Postal orders provide a convenient means of transmitting small sums of money through the post. For sums up to £1 7s. 10d. the sending of postal orders is a cheaper method of transmission than the use of money orders. Postal orders may be purchased at, and are payable at, most P. Os. throughout Great Britain, N. Ireland, the Channel Is., and the Isle of Man. They may be sent without restriction to most parts of the Brit. Commonwealth and to Eire and Iraq. They are not payable at P. Os. in Australia and may not be sent to Canada nor to most foreign countries.

They may also be sent under the same conditions as to civilians to persons in his majesty's forces, his majesty's and merchant ships. Postal orders are issued for 6d. and by sixpenny steps up to 5s., and for 6s., 7s., 7s. 6d., 8s., and thence by one-shilling steps up to 21s. Their value may be increased by affixing postage stamps, not exceeding two in number, and up to the value of 5d. on denominations up to 4s. 6d. and 11d. on denominations above 4s. 6d. The sender of a postal order must enter thereon in ink the name of the person to whom the amount is to be paid and is recommended also to fill in the name of the office at which it is to be paid. Postal orders may be crossed for payment through a bank. A counterfoil is provided on every postal order, for retention by the purchaser. Postal orders, unlike bank-notes, do not represent value in themselves and are not negotiable. Only the rightful owner may cash a postal order; and if the sender has filled in the name of the payee, the owner may take legal action to recover the amount from any person who negotiates it. When a postal order has been paid, the P. O. is not liable if any further claim is made for payment. As a general rule postal orders are valid for a period of six months from the last day of the month of issue.

POST OFFICE SAVINGS BANK, see under SAVINGS BANK.

NATIONAL SAVINGS CERTIFICATES are sold at most P. Os., and offer a means of investing small sums in a gov. security bearing a high rate of interest free of income tax. See further under **NATIONAL SAVINGS CERTIFICATES**.

GOVERNMENT ANNUITIES AND LIFE INSURANCES.—Immediate annuities from £1 up to £300 may be purchased through the agency of the P. O. savings bank on the life of any person over five years of age. Husband and wife may each purchase an annuity for £300. Annuities are payable by equal quarterly instalments on Jan. 5, April 5, July 5, and Oct. 10. On the death of an annuitant a single payment equal to one-fourth part of the annuity is made to the representative, if claimed within two years.

THE POST OFFICE AND THE CRIMINAL LAW.—The law as to larceny or other offences in relation to the P. O. is to be found for the most part in the Post Office Act, 1908, as amended by the Post Office (Amendment) Act, 1935. A P. O. official who steals or destroys a letter is liable to imprisonment for seven years, and if the letter contains any chattel, money, or valuable security, to imprisonment for life. Larceny of a letter, or of any chattel, money, or valuable security out of a letter in course of transmission by post, is punishable with imprisonment for life. Fraudulent retention, or secretion by any person of letters found or delivered by mistake, is also heavily punished, whilst the opening of other people's letters is punishable by a fine of £50 or six months' imprisonment. P. O. officials who wilfully or negligently omit or delay to deliver or improperly divulge

the purport of any telegraph message are liable to a heavy fine. Disclosure or interception by P. O. officials of any message entrusted to them may involve twelve months' imprisonment. Obstruction or molestation by any person of an officer of the P. O. whilst in the execution of his duty is punishable with a fine of £10 or one month's imprisonment or to both such fine and imprisonment. The transmission by telephone of any grossly offensive or indecent message may entail a fine of £10 or imprisonment for one month or both such fine and imprisonment. A person who sends a message by telephone which he knows to be false for the purpose of causing annoyance, inconvenience, or needless anxiety to any other person, or who persistently makes telephone calls without reasonable cause for any of the purposes above mentioned, is also liable to a fine of £10 or one month's imprisonment or both such fine and imprisonment.

FOREIGN POSTAL SYSTEMS: The United States.—The hist. of the Amer. P. O. shows a parallel deficiency of revenue to that of England on the occasion of the reforms of 1884 on the introduction of the two cents (1d.) universal postage. The feature of the Amer. postal system for seventy years had been the development of the railway mail service, which by reason of the vast extent of the country and the great mileage of railroads rapidly reached a pitch of excellence which has never been excelled. But after the First World War the U.S. postal service began the development of air mail services. At first the P. O. Dept. ran its own planes. Now all the work is done by contract with aeroplane companies and has developed into the greatest air service in the world, linking up all the great cities in the U.S.A. The fee is 6 cents an ounce or fraction thereof up to 8 oz. In the U.S.A. all mail matter is divided into four classes. *First-class matter* includes letters, postal cards, post cards, and anything sealed against inspection. Rate is 3 cents an ounce for each ounce or fraction of an ounce. *Second-class matter* includes all printed newspapers and periodicals that have been entered as second-class matter. Rate to publishers 1 cent a pound or fractional part thereof, to others 1 cent for each 2 oz. or fraction thereof. *Third-class matter* includes pamphlets, printed books, engravings, circulars, not exceeding 8 oz. Rate 2 cents for the first 2 oz., 1 cent each additional ounce, with cheaper rates for books. *Fourth-class matter*: Previous to the Parcel Post Act, which came into effect in Jan. 1913, there was no distinct parcel post in the U.S.A. Until then parcels were sent by post as fourth-class matter. The Act of 1913 provided that fourth-class matter should embrace all matter not included in the first three classes and not exceeding 11 lb. in weight, nor 72 in. in length and girth combined. The limits are now 70 lb. and 100 in. New rates for parcel post are shown in the table.

Franking, which was greatly abused, was abolished in 1873, but the P. O.

carries official matter under penalty labels or envelopes (that is, containing a notice of the penalty incurred by improper use). This privilege is extended to congressmen and gov. officials. Before 1862 carriers were remunerated by collecting 1 to 2 cents for delivery. The free delivery was first authorised by law in 1863, and in 1901 866 cities and tns. were included in this scheme; since 1896 it has included rural pop. also. Immediate delivery by special messenger was instituted in 1885. In 1864 the money order system was estab. There is a registry system in force increasing according to the value of the packet registered. There is a postal savings system in which deposits from individuals are accepted from \$1 upwards, and no one can have more than \$2500 to his credit. In 1947 \$3,392,773,461 were thus on deposit. Saving certificates are issued. The stamp system for amounts less than \$1 is in force. Interest at 2 per cent. In 1948 there were in the U.S.A. 41,695 P. Os., the total revenue in 1946 was \$1,224,572,173, and the expenditure \$1,353,653,679.

was then taken up by Dr. von Stephan, head of the Prussian postal service. His draft treaty establishing a General Postal Union was laid before the first congress, at Berne in 1874, and was put into force, as the 'convention' in 1875. Under it, for postal purposes, international frontiers are regarded as non-existent, and there is an unrestricted right to use the services of any other country, with an obligation to pay. The convention prescribes international postage rates and rules for the make-up of mail, deals with the mutual settlement of accounts, and, with sev. subsidiary agreements, embraces all aspects of the international postal service. Congresses are held at five-yearly intervals to revise the convention and agreements, the congress being the main legislative body of the union. The latter is now one of the specialised agencies of the United Nations. All countries, except a few unimportant ters., are now party to the convention.

See J. W. Hyde, *The Royal Mail*, 1880; J. C. Hemmeon, *History of the British Post Office*, 1912; L. Kalinus,

U.S.A. FOURTH CLASS (PARCEL POST) MAIL

Zone, Miles	First lb.	2 to 10 lb	11 to 70 lb.
	cents	cents	cents
Local	10	10	0-75
(1) 2 to 150	12	20	2-00
(3) 150-300	13	30	2-50
(1) 300-600	14	45	4-25
(5) 600-1000	15	60	5-50
(6) 1000-1400	16	7-5	7-25
(7) 1400-1800	17	9-5	9-25
(8) over 1800	18	11-5	11-25

France.—To France belongs the honour of having originated, through the celebrated Pierre d'Alméras, not only the system of transmission of money by post, but the registration of letters. As in England, so in France, the P. O. revenue and administration during the seventeenth century were farmed out, and similarly that system led to intolerable abuse and corruption. In regard to the inauguration of a system of insuring articles of declared value, the issue of postal notes payable to bearer, and the introduction of postage stamps, France generally lagged from ten to twenty years behind England.

Germany.—The outstanding name in the hist. of the Prussian P. O. is that of Dr. von Stephan, who was also the dominating figure in the organisation of the International Postal Union of Bern. As in England the Prussian system grew out of a purely gov. service, stimulated by the private letter and parcel post of a commercial guild.

UNIVERSAL POSTAL UNION.—The impetus given to international correspondence by the Industrial Revolution demanded a simplification of rates, weights, etc. On the initiative of Montgomery Blair, postmaster-general of the U.S.A., a preparatory conference was held in Paris in 1863, and the idea of reform

Weltgeschichte der Post, 1937; E. R. Davis, *International Postal Service*, 1938; G. A. Walker, *Haste, Post, Haste!*, 1938; G. A. Campbell, *His Majesty's Mails at Home and Overseas*, 1939; J. J. Floherty, *Make Way for the Mail* (U.S.A.), 1939; and H. Robinson, *The British Post Office. A History*, 1949.

Post-tertiary, see QUATERNARY.

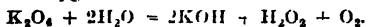
Potash, see POTASSIUM.

Potash Water, see AERATED WATERS.

Potassium. Symbol K, atomic number 19, atomic weight 39.10. It was first isolated by Davy in 1807 by the electrolysis of melted caustic potash, and occurs in the form of silicates in rocks such as felspar, e.g. orthoclase is $KAlSi_3O_8$ and mica. Through weathering action these rocks are broken up and the P. salts pass into the soil, from which they are taken up by plants. P. is an essential constituent of plant food; when plants are burned the P. is left in the form of the carbonate, and this was formerly the chief commercial source of P. compounds. Part of the P. salts find their way into seas, lakes, and mineral springs. When inland seas evaporate, the more insoluble salts, e.g. common salt, are first deposited, and then the more soluble salts, chiefly those of P. and magnesium. In this way the Stassfurt deposits which, with the

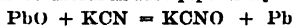
deposits in Alsace now constitute the chief source of P., were formed; the more important compounds being carnallite ($KCl \cdot MgCl_2 \cdot 6H_2O$), kainite ($MgSO_4 \cdot KCl \cdot 3H_2O$), sylvinite (KCl). When Davy obtained the metal by electrolysis of caustic potash, globules of metal appeared on the negative wire. It was prepared at one time by heating P. carbonate with finely divided carbon: $K_2CO_3 + 2C = 2K + 3CO$. The vapour of the metal tends to combine with carbon monoxide to form an explosive compound, $P. carbonyl$, $K_2(CO)_4$, and the yield is thus reduced. This method was replaced by the Castner process, in which caustic potash was heated in iron crucibles with carbide of iron. The resulting P. was distilled off and collected. Both these methods gave place to the modern electrolytic method in which fused P. chloride is electrolysed. P. is a soft silvery-white metal, melts at 62° , boils at 757° , and has a sp. gr. of 0.875. P. and its compounds give a violet tint to the Bunsen flame. P. oxidises in moist air, and combines with the halogens more vigorously than sodium does. It reacts with water so vigorously that the evolved hydrogen catches fire and burns with a lavender flame. On account of its reaction on water and air it must be kept in sealed tins or in naphtha, which does not contain oxygen and is incapable of dissolving a sufficient amount of oxygen from the air to permit much oxidation of the P. P. forms a liquid alloy with sodium.

POTASSIUM COMPOUNDS: *Potassium hydride*, a white crystalline solid, is formed when hydrogen is passed over P. heated to $360^\circ C$. It acts upon water, forming caustic potash and hydrogen. *Potassium monoxide* (K_2O), a yellow solid, is obtained by heating potassium nitrate with P. *Potassium tetroxide* (K_4O_6), formed when the metal burns in oxygen, is a yellow powder which is decomposed by water, forming P. hydroxide, hydrogen peroxide, and oxygen.



Potassium hydride, obtained (a) by acting on water with P., (b) by boiling P. carbonate with milk of lime, (c) by electrolysis of aqueous P. chloride, using special precautions (see SODIUM). It is a white amorphous substance which melts at 360° , and absorbs moisture from the air. It is used to absorb gases, e.g. carbon dioxide. It readily dissolves in alcohol, and the alcoholic solution is often used in organic chem. where water would cause decomposition. It is used in making soap. *Potassium chloride*, obtained from carnallite, is used in the preparation of other compounds and as a manure. *Potassium bromide*, a white solid, crystallises in cubes, and is useful in medicine in cases of nervous disease, and as a hypnotic, and also in photography for preparing silver bromide. *Potassium iodide* occurs in cubic crystals, useful in medicine and photography. *Potassium chlorate* is now largely obtained by electrolysis of a hot solution of P. chloride. It is useful as an oxidising agent, e.g. in the

preparation of the dye aniline black, in fireworks, and in making matches, and is also used in medicine. *Potassium carbonate* is a white salt, extremely soluble in water. It is largely used in the manuf. of other P. compounds. *Potassium bicarbonate* is a white crystalline solid which decomposes when heated, evolving steam and carbon dioxide, and leaving normal P. carbonate. It is used in medicine, e.g. in dyspepsia and gout. *Potassium nitrate* occurs naturally in rich soils. It is a white crystalline solid. It is largely used in the preparation of gunpowder, and in medicine (e.g. for asthma, when porous paper is soaked in the solution, dried, and ignited, and the fumes inhaled), and as a food preservative. *Potassium cyanide* crystallises in cubes extremely soluble in water. It is highly poisonous. It is a reducing agent, and is therefore useful in blowpipe analysis, e.g.:



It is useful in electroplating. Large amounts of the cyanide are used in extracting gold from its ores, particularly in the Transvaal colony.

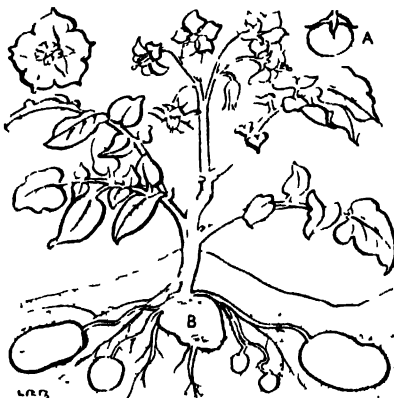
Potassium Antimonyl Tartrate, see TARTARUM.

Potassium Chlorate, see POTASSIUM.

Potassium Hydrogen Tartrate, see CREAM OF TARTAR.

Potassium Nitrate, see POTASSIUM.

Potato, or *Solanum tuberosum*, plant (family Solanaceae), the underground tuberous stems of which constitute the most important vegetable crop in Britain.



POTATO

A, Seed vessel. B, Seed tuber.

It was introduced from America into Britain in the sixteenth century by Sir Walter Raleigh, but had been brought a little earlier to Italy and Spain. For nearly 200 years it was not recognised as a valuable food product, and it is only since the middle of the nineteenth century that attempts have been made to improve the quality and cropping powers of the tubers.

Great numbers of new varieties, obtained by sowing the seed from the berries obtained by cross-fertilisation of the flowers, have been introduced from time to time, and the best appear gradually to decline in value, becoming less productive and more susceptible to disease. Varieties are classified as early, maincrop, and late. In ordinary practice the crop is grown from tubers, the eyes of which are buds that can develop into new plants. Much superior crops are obtained by sprouting the 'seed' tubers in shallow wooden trays where they are exposed to light and air, and thoroughly *greened*. Tubers so prepared can be left to be planted until weather and soil are in a suitable condition, and not only mature earlier but produce considerably heavier and healthier crops. Ps. do best in a warm and comparatively dry climate, with a deep sandy loam and porous sub-soil. From 12 to 18 cwt. of sets are required per acre. The early varieties are planted in Feb. and March; drawing the earth up to the rows is an important protection against frosts. The main crop and late varieties after lifting are stored in straw-covered clamps or pits. The two worst diseases of Ps. are those known as the P. disease (*Phytophthora infestans*) and P. scab. The use of healthy seed and proper rotation of crops is the best preventive. The value of spraying the foliage with Bordeaux Mixture, composed of copper sulphate and lime, has been repeatedly demonstrated, and this practice by growers is steadily on the increase. In 1816 and 1817 Ireland was subjected to extreme famine owing to the failure of the P. crop. Since the Second World War Brit. scientists have made various experiments in an attempt to produce a blight-resisting P. See W. G. Burton, *The Potato*, 1918, and R. N. Salaman, *The History and Social Influence of the Potato*, 1949.

Potato Beetle, see COLORADO BEETLE.

Potato Spirit, see FUSSEL OIL.

Potchefstroom, or Mool River Dorp, tn. in the S. of Transvaal prov., S. Africa, on the Mool R., 91 m. S.S.W. of Pretoria. It is in the centre of an agric. and gold-mining area and is a popular health resort. It is the oldest tn. in the Transvaal, and was founded by *Vortrekkers* crossing the Vaal in 1838, and named after their leader, Potgieter. The first shots against Brit. troops were fired at P. in 1881, and during the S. African war, 1899-1902, P. was occupied by both sides on sev. occasions. There is an agric. college and a univ. college which was incorporated as a constituent college of the univ. of S. Africa in 1921. Pop. 25,600.

Potemkin, Gregory Alexandrovich (1739-91), favourite of Catherine II. of Russia. P. came of a poor Polish family. He began life as an obscure officer in the army, but succeeded in attracting Catherine by his presence and his wit. In a short time he had risen to be chamberlain at the court. He became the open favourite of the queen, incurring the hostility of Count Orloff, who was her former favourite. But P. overcame all

opposition, and soon became the most powerful person at the Russian court. His successes in the war against the Turks served to increase his ambitions and authority so much that he began to aim at becoming emperor of Constantinople. In the subsequent intrigues and machinations between the queen and himself he was worsted, and died soon afterwards, possibly by poison. P. had great qualities as a statesman and as a general. See life by G. Solovey Tchik, 1948, also study by D. B. Wyndham Lewis in *Four Favourites*, 1948.

Potential, see ELECTRICITY.

Potentilla, genus of herbs and shrubs (family Rosaceae) with pinnate or palmate leaves, and generally yellow or white flowers, followed by an eterio of achenes. Among the numerous Brit. species are *P. fragariastrum*, the barren strawberry; *P. silvestris*, common tormentil; and *P. anserina*, silver weed or goose grass. Sev. species are grown in gardens.

Potentiometer, see ELECTRICITY, *Electrostatics*.

Potenza, tn. of Italy, cap. of the prov. of the same name, 34 m. E. of Salerno. It has a Doric cathedral and is the seat of a bishop. It suffered severely from earthquake in 1857, and the cathedral suffered heavy damage in the Second World War. Pop. 25,100.

Pot-holes, or Giant's Kettles, cavities varying in diameter and depth, formed most commonly by glacier streams, which pour down a crevasse in a 'moulin' or swirling eddy, whose force drives the pebbles, gravel, and other detritus, which are borne along in the torrent against the rock surfaces. These become worn and abraded, the hollows being sometimes basin- and sometimes pipe-shaped. The largest pot-hole in the Gletscher Garten, Lucerne, measures 30 ft. deep and 26 ft. across.

Poti, seaport in the Georgian S.S.R., 55 m. W. of Kutais, on the Black Sea, at the mouth of the Rion. The small and open harbour has been extended and improved; corn, manganese, palm wood, and grain are exported. Pop. 10,000.

Potomac, riv. of the E. U.S.A., rising in two branches in the Alleghany Mts., and flowing as the boundary between Maryland and Virginia in a winding S.E. course, to fall into Chesapeake Bay. Its chief tribs. are the Shenandoah and the Monocacy. At Washington, 125 m. from its mouth, the riv. becomes tidal and navigable. Length 360 m.

Potosi: 1. S.W. dept. of Bolivia, bounded by Chile on the W. and Argentina on the S.; it has silver, gold, tin, and copper mines; bismuth, zinc, and lead are also important. Area 45,867 sq. m. Pop. (estimated 1947) 768,800. (2) Tn., cap. of the above prov., on the Cerro de P. (altitude 13,325 ft.), 50 m. S.W. of Sucre. It is gradually falling into decay, but has a univ., a fine granite cathedral, and mint. The silver mines, discovered in 1546, and now nearly abandoned, were the cause of its early prosperity. Gold is still mined and zinc and bismuth are profitable. Pop. 45,000.

Pototan, tn. in the prov. of Iivlo, is. of Panay, Philippine Is. Pop. 43,000.

Potsdam, former cap. of Brandenburg, Prussia, situated on an is. formed by the Havel and the Spree, 16 m. W.S.W. of Berlin. Before the Second World War it was a finely built tn., with wide streets and handsome garden squares. It was a city of palaces, the prin. being the Royal Palace (seventeenth century), the Sans Souci, the Charlottenhof, the Marble Palace, Friedrichskron, and Babelsberg. Many of these were damaged in the Second World War, but the Sans Souci, built by Frederick the Great, escaped. P. was the second royal residence of Prussia, and one of the notable features is the noble Brandenburg Gate, which is built on the lines of Trajan's triumphal arch at Rome. The garrison church contains the tomb of Frederick the Great, and the Friedenskirche the mausoleum of the Emperor Frederick III. and his Eng. consort. The prin. occupations of the inhab. are the manuf. of chemicals, sugar, silk, woollens, cottons, etc., while horticulture is extensively engaged in. P. is not an anct. tn., dating only from the time of the Great Elector, before which it was merely a small fishing hamlet. In 1805 the Fr. sacked the tn. and bore away many relics. After 1945 P. came within the Russian zone of Germany. Pop. 136,000.

Potsdam Agreement, agreement arising out of the three-power conference held at Potsdam, July 16-Aug. 1, 1945, between Winston Churchill and Clement Attlee for Great Britain, President Truman for the U.S.A., and Marshal Stalin for the U.S.S.R., together with various ministers and chiefs of staff of these countries. The conference was called to determine the future of Germany after the unconditional surrender of May 7, 1945. Certain frontier changes had already taken place, particularly in relation to Poland's new boundaries (see *POLAND, History*). The P. A. provided that (1) a committee of foreign ministers of the U.S.A., U.S.S.R., Britain, France, and China should be estab. to frame peace treaties with Germany's allies, to be submitted to the United Nations; (2) the commanders-in-chief of France, Britain, the U.S.A., and U.S.S.R. should exercise supreme authority in their respective Ger. zones, on instructions from their govts., and also jointly, as members of the control council in affairs concerning the whole of Germany; (3) the Allies should disarm and demilitarize Germany and prevent the future use of Ger. industry for war purposes. Nazism should be entirely destroyed and the Ger. people made aware of their defeat, and re-educated on democratic lines. For the present no central Ger. Gov. should be estab. but Germany should be treated as one economic unit; (4) it was agreed that Königsberg should be transferred to the U.S.S.R., and special provisions were made concerning reparations due to the U.S.S.R. The Oder-Neisse line was made the provisional Polish W. frontier, its final confirmation to await the peace

conference; (5) war criminals should be brought to trial, and any transfer of Gers. from Poland, Hungary, and Czechoslovakia should be humanely carried out. For further developments after the P. A. see *GERMANY, History*.

Potter, Beatrix (Mrs. William Heelis) (1866-1943), Brit. authoress of tales for children. She passed a lonely Victorian childhood in Bolton Gardens, S. Kensington. In the N. she lived a secluded life preferring to remain unknown and to conceal her art behind the everyday character of a Lakeland farmer. Her struggles for independence and an unhappy love affair marked her life until her happy marriage. She will be remembered as the authoress of *Peter Rabbit* (1902) and other nursery masterpieces. Among the best are: *Squirrel Nuts* (1903); *Benjamin Bunny* (1904); *Mrs. Tiggy-winkle* (1905); *Miss Moppet* (1906); *Jemima Puddle-Duck* (1908); *Ginger and Pickles* (1909); and *Pipkin Bland* (1913). In her small and special sphere she conveyed truth through fantasy, enlarging the reader's perception of life by poetic means. Of the story books which appeared after her marriage only one, *Johnny Town-Mouse* (1918) can be compared in style or creative effort with her earlier work. The others, including *The Fairy Caravan* (1929); *Sister Anne* (1932); and *Wag-by-Wall* (1914) are less happy experiments addressed to her Amer. public. See Margaret Lane, *The Tale of Beatrix Potter*, 1946.

Potter, Paul (1625-54), Dutch animal painter, b. at Enkhuizen. Some of his best pictures are: 'The Young Bull', 'The Dairy Farm', 'The Herdsman', 'Orpheus', 'Equestrian Portrait of Tull', and 'Landscape with Cattle' (at Munich). See W. von Bode, *Meister der holländischen und ulamischen Malerschulen*, 1921.

Potteries, The. Dist. of N. Staffordshire. It is the centre of earthenware and china manufs., and comprises Hanley, Stoke-on-Trent, Burslem, Longton, Tunstall, and Fenton. These, together with other smaller neighbouring dists., were made into the co. bor. of Stoke-upon-Trent in 1910.

Pottery, term applied to all objects made out of clay and baked. It is derived from the Fr. *poterie*, which in its turn originates in the Lat. word *potum*, a drinking vessel. The Gk. word for earthenware is *keramos*, whence the term ceramics, applied to the study of P. In general, with perhaps some insistence on the artistic point of view. All P., whether earthenware, stoneware, or porcelain, is made from a clay paste which can be fashioned while in a plastic state into more or less elaborate shapes, and afterwards converted into a hard and durable material by the application of heat. Early potters were content to pick out the coarse material from the local clay and to work up the rest with water into a fairly homogeneous mass. The discovery of clays of particularly fine natural texture occasioned a demand for that material, and potters all over the world now obtain their clay from a few

favoured dists. The clay best esteemed for fine P. is that known as china-clay or kaolin, and is mostly found in Cornwall, Devon, and Dorset. Various other substances are mixed with the clay to form the body of the P.; sand or felspar is added in the coarser varieties, while calcined flints, fine chalk, or calcined ox-bones are used to form the material out of which the finest examples of white P., or porcelain, are made. Porcelain owes its origin and development to China, and was in the past usually produced under royal patronage. The greatest invention in the hist. of P. is that of the potter's wheel, a contrivance which consists essentially of a disk or table revolving horizontally. The clay is thrown on the centre of the wheel and fashioned by the hand of the potter, aided by a few simple tools, into any symmetrical shape about the axis of the wheel. The clay is then commonly put aside to dry to a more tenacious consistency, and is then more accurately worked by steel tools in a lathe, while unsymmetrical appendages, such as handles and spouts, can be separately moulded and attached to the main body. The articles are then placed in coarse earthenware vessels called *scappars* and piled up in the kiln to be baked. This is often performed in two or more stages; the P. is turned out first in a state called biscuit-ware, in which any decorated pattern may be printed or painted; the colour is permanently attached by another firing. In order to lend a lustre to the porous surface, the articles are covered with a composition known as a glaze, of which the prin. ingredient is white lead. This substance is converted into a hard, transparent, and lustrous film by an additional firing process. Great scientific progress has been made in recent years in the manuf. of electrical porcelain in N. Staffordshire and elsewhere. A feature is made of the production of super-insulators for high-tension work. There has also been introduced a system of potter's drying stoves designed to enable the electrical porcelain clay to be dried more uniformly and more quickly than is normally necessary in the case of domestic P. Further, the pieces are sometimes so large that they have to be specially railed into the stove to obviate strains which might arise through vibration. Gas-fired ovens have been erected for the adequate and safe firing of the larger constructions.

HISTORY OF THE ART OF POTTERY.—P. was one of the elements in the Neolithic revolution which started somewhere in the E. Mediterranean between Iran and Egypt. The earliest forms were bag-shaped pots and shouldered bowls based on vessels of animal skins. The decoration is very simple; the base of the pot is rounded and there are often lugs for carrying. Sev. varieties of P. are known in the Bronze Age, but all are local products. With the introduction of the hand turn-table or the wheel in the Early Iron Age, P. making became a true industry in Britain.

Egypt, Mesopotamia, etc.—The art of

the potter proceeded on parallel lines in Egypt and the Near and Middle E. Bricks made of sun-dried clay, with an admixture of straw, were commonly made at an early period. In Egypt these were unglazed, but in Assyria glazed bricks were used for decorative courses in the most important buildings. Clay tablets and cylinders were used for inscriptions, etc., and these were baked in order to preserve them. The finest art of the Egyptian potters is exemplified in their glazed decorated ware. In the earliest period vases, bowls, etc., were made unglazed, a red colour was obtained by means of a wash of red clay, and black ware was obtained by restricting access of air in baking clay containing iron. Vitreous glazes containing copper were afterwards used, and, although sev. colours were obtained, the finest examples are contained in the turquoise blue glazed ware of the twelfth to eighteenth dynasties. In Ptolemaic times the glaze becomes less opaque, and beautiful effects were obtained by overlaying the old glaze with the new translucent material.

Crete.—In Crete valuable discoveries of P. were made at the beginning of the twentieth century. Early Minoan ware consisted chiefly of pots made from coarse grey clay. This ware was hand-polished and decorated with incised lines, as was also P. from the Antiporas Is., 2500 B.C. A ripple design is also found on Neolithic ware from Crete, all of which dates from before 3000 B.C. In the Bronze Age, the Minoan period at Cnossos, terra-cotta coloured clay was used and was probably baked. This ware was painted dull black and, later, was decorated with white patterns in imitation of the design on Neolithic ware. In the middle Minoan period that followed, the potter's wheel introduced from Egypt was probably first used. Patterns of curves and spirals formed the decoration and were either in light colours upon a black background (polychrome) or were a dark design on the original clay (monochrome). Later Minoan period produced eggshell vases and a relief design was introduced. Large storage jars, 'pithoi,' similar to those in use to-day, were made first at this time, and a change in favour of monochrome rather than polychrome took place. A durable black varnish was discovered which was not a glaze but probably a forerunner of that used in Attic black figure vases. Later Minoan P. was all monochrome, with brown black glaze on buff clay slip, and was polished by hand. Design became naturalistic, plants, flowers, fish, and shells being represented. A quick deterioration followed. P. became stiff in shape and the decorations were conventionalised until they finally disappeared altogether. Cretan P. was used for many purposes, including cups, kettles, ornaments, and cupboards.

Greece.—P. in Greece appears to have developed independently of any Egyptian or Assyrian influence until a late period. The Gks. even credited themselves with the exclusive invention of the potter's

wheel. The most typical form of Gk. P. is the vase, manifold as regards shape and probable uses, but possessing the common features of foot, body, and neck. They were used as measures, as indicated by the use of the term *amphora*, and as storeplaces for food, toilet preparations, and the like; they were given as prizes in athletic contests, and some had a purely sacramental or religious function, as is evidenced by their constant occurrence in tombs in every part of the Mediterranean coast. The earliest decorations were obtained by inscribing geometrical and floral patterns by means of a pointed instrument. Strictly speaking the Gks. used no glaze; but a black varnish of uncertain composition is characteristic of all the best decorated work. The black coat was painted on in the form of animals, human figures, etc., and the material consolidated by another firing. Later it was customary to exhibit the figures in red, the background being filled in with the black pigment. Numerous examples of these vases, called Etruscan ware from their plentiful occurrence in Etruria, have been preserved. From the fourth century B.C. Gk. P. becomes over-ornamented and florid; the drawing is careless, and the subject-matter shows signs of decadence in the Gk. spirit.

Rome.—From an artistic point of view, Rom. pottery is inferior to Gk. There is earthenware, used for domestic purposes, and the bright red glazed ware produced in Italy, S., central, and E. Gaul which found its way to almost every Rom. prov. It is traditionally known as Samian ware, and from its wide distribution its chronology is useful to the archaeologist. The forms show great variety, and nearly all are borrowed from metal-shapes. Decoration is usually moulded, applied, or stamped; but barbotine, painting, incision, rouletting, and marbling are also used. The coarse domestic P. was widely manufactured throughout the empire, and many potters' kilns have been found. Often a local potting tradition combines with the prov. Rom. to provide a fabric of merit.

Asiatic Pottery.—It is to China that we owe sev. of the distinctive features of artistic P. The development of ceramics seems to have followed the same lines as elsewhere in the early stages, though the Chinese appear to have been the first to discover that powdered felspathic rock mixed with lime could give a high glaze. When porcelain was first produced is not known. Chinese potters favoured high temp. firing, which resulted in a highly vitrified stoneware. The discovery of the properties of kaolin appears to have led to the production of the thin translucent ware known as porcelain about A.D. 1000. Owing to the high temp. of firing, the Chinese were restricted to such colours as cobalt blue and a blood-red copper pigment in their decorative schemes. Afterwards other colours were painted after the blue and red had been fixed and the ware fired again at a lower temp. The influence of Chinese porcelain cannot be over-esti-

mated. It was felt first by the potters of Asiatic countries, and afterwards inspired European craftsmen to fruitless endeavour. *Persia* had received the heritage of the Assyrian skill in glaze, and, like the Chinese, aimed at a dead-white stone-ware. From the twelfth to the sixteenth century Persian P. shows fine examples of brilliantly coloured patterns on a white ground. P. (among other things) from the excavations at Nishāpūr, Persia, in the Metropolitan Museum's Iranian expedition of 1938-40 show that Nishāpūr was an important centre of early Islamic art in evolving the Saljuk style. The P. found included a ninth-century polychrome glazed bowl, a green P. bottle in the shape of a fish, a red, black, and white tenth-century glazed bowl, a green P. bottle, and a carved P. lantern carved before firing, all from Teppah Madraseh. *Turkish* P. of the same period is characterised by a white body of sandy texture; strong colours are used, and a thick transparent glaze. The general effect was to make the colours run somewhat, presenting a crowded effect of brilliant yet harmonious colour. The luxurious impression is often heightened by the use of gold leaf. The early P. of Japan was earthenware, and such pieces are valued very highly in that country. The Jap. claim to have learnt the art of P. from the Koreans, but many Jap. potters studied their trade in China. The Jap. potter, Kato Shiroz Oyemon, learnt from China, and in Seto in 1223 made 'harefur' cups for tea-drinking, a custom also imported from China. Later tea-bowls of porcelain, used in the numberless tea-drinkings, formed the greater part of Jap. P. Among Jap. P. we find *kakiyemon* ware of creamy white paste with moulded forms and sparsely scattered decoration. *Imari* or old Japan is chiefly blue and white P. *Orochi* or *nabeshima* ware has a blue comb-like pattern round the base of cups and bowls. *Kishiu* ware and *Kutani* are other forms of old Jap. porcelain, while there is a great deal of kaolinic stone-ware.

European Pottery.—After the decline of the Rom. Empire P. in Europe degenerated. The greatest advance in medieval times came with the introduction of tin-enamel from the Moslem invaders of the S. of Europe. The white enamel consisted of silicates of lead and potash combined with oxide of tin. Articles made of buff-coloured clay were dipped in this wash and attained an opaque, white colour. The knowledge of this process spread from the is. under Moorish occupation to Italy, and the name *Majolica* is given to it. Ware of this period to denote its connection with the is. of Majorca. Sometimes the pattern was scratched through to the underlying red clay, and a beautiful metallic lustre was lent to the surface after glazing owing to the presence of the tin. Fine painted examples of tin-enamelled ware were produced at Faenza, whence the name 'faience' for glazed painted stone ware in general. From the sixteenth century

the centre of the industry was transferred to France, where brilliantly decorated enamel-ware was produced at Rouen. About 1600 the production of enamel-ware was initiated in Holland at Delft. The best kind of Dutch P. was in the form of earthenware, although the potters of Delft attempted to imitate the surface of Chinese porcelain and sometimes termed their ware porcelain. An important section of Dutch P. was the manuf. of tiles which were used for wall decoration. The valley of the Rhine was the seat of the production of a hard white stone-ware, glazed by throwing salt into the kiln. In England the Rhine valley ware was imitated at Fulham and in N. Staffordshire, while Lambeth, Bristol, and Liverpool produced delft with decorations, mostly of cobalt-blue. England also produced stone-ware which was white throughout, and this characteristically Brit. variety of P. underwent marvellous development in the hands of Josiah Wedgwood. The attempts at copying Chinese porcelain were first distinctly successful in Germany, and a factory estab. by Bottger at Meißen was the precursor of many others. Highly vitrified stone-ware had been produced in France at St. Cloud, and greater success attended the work of the royal factory at Sevres, estab. in 1756. The process was, however, very laborious and expensive, and the artistic value of most varieties of Sevres porcelain has been greatly overrated. In Denmark the art of P. has always been remarkable for its wonderfully correct shape, and to-day also for its perfect glaze. In England factories for the manuf. of porcelain on continental lines were estab. at Chelsea in 1750 and at Worcester in 1751. At Bow (1744) the use of bone-ash led to excellent results, and the factory at Plymouth (1768) produced a fine hard, white ware made from Cornish clay. The factory was removed to Bristol in 1770, and the characteristic porcelain became widely known. During the Napoleonic wars the industry in England developed on somewhat utilitarian lines and there was a tendency to forgo artistic considerations. Of recent years there has been a revival in the direction of P. of real decorative value, to which the work of the Rookwood factory has undoubtedly contributed. See A. Jacquemart, *Histoire de la céramique*, 1873; A. Brongniart, *Traité des arts céramiques*, 1884; L. M. Solon, *The Art of the Old English Potter*, 1885; W. Burton, *English Earthenware and Stoneware*, 1901, and *Porcelain*, 1906; B. Lauter, *The Beginnings of Porcelain in China*, 1917; C. M. Fraunheim, *A Practical Ceramic Dictionary*, 1924; A. F. Butler, *Islamic Pottery*, 1926; H. Wilson, *Ceramics, Clay Technology*, 1927; A. W. Hodgson, *How to identify Old China*, 1928; F. Poncetton and G. Salles, *Les Poteries françaises*, 1928; A. B. Searle, *The Clay-worker's Handbook*, 1929; R. L. Hobson, C.B., B. Rackham, and W. King, *Chinese Ceramics in Private Collections*, 1931; I. Fane, *The Scottish Tradition in Pottery*, 1948; F. H. Garner, *English Delft-ware*, 1948; R. G. Cooper, *The*

Modern Potter, 1948; and W. B. Honey, *European Ceramic Art* (vol. 1.), 1949, and *English Pottery and Porcelain*, 1949.

Pottstown, bor. of Pennsylvania, U.S.A., in Montgomery co. on the Schuylkill R., 18 m. E.N.E. of Reading. There are iron and bridge works, boiler shops, etc. Pop. 21,200.

Pottsville, city of Pennsylvania, U.S.A., co. seat of Schuylkill co., at the junction of the Norwegian and Schuylkill Rrs., 18 m. N.E. of Harrisburg. It is the centre of an anthracite coal dist., and there are manufs. of iron and steel goods and textile and silk mills. Pop. 24,500.

Pouched Mouse, or Kangaroo-rat, names applied to species of *Dipodomys*, a genus of rodents in the family Heteromyidae. There are in all twelve species of these jerboa-like creatures all belonging to N. America. They are burrowing animals, with long hind limbs and tails, and cheek-pouches. *D. merriami* and *D. philippsii* are well-known species.

Poudré Weather, see under SNOW.

Poughkeepsie, city and co. seat of Dutchess co., New York, U.S.A., on the Hudson R. It is a manufacturing centre of considerable importance, and is noted for its educational institutions, Vassar College being one of the most famous women's colleges in America. P. regatta is celebrated. Pop. 41,000.

Pouishnoff, Leff (b. 1891), Russian pianist and naturalised Brit. subject, educated at the Petrograd conservatoire where he gained a first-class diploma. He was also awarded the gold medal and the Rubinstein prize. He made his first appearance in Uman in 1896, and appeared also in Petrograd in 1910 and in London in 1921.

Poulenc, François (b. 1899), Fr. composer, b. in Paris, chiefly known as a composer of sonatas for wind instruments: a sonata for two clarinets, a sonata for clarinet and bassoon, and a sonata for trumpet, horn, and trombone, besides a concerto for harp-sichord. He was a member of the group of Fr. composers led by Honegger (q.v.) and known as 'Les Six'. He has also composed a ballet, *Les Biches*, produced by Diaghilev (1925), and a one-act *comédie bouffe* entitled *Le Gendarme incompris* (1920). His works show the influence of the eccentricities of the whimsical composer Erik Satie (1866-1925), and the extravagance of his friend, the poet Jean Cocteau (q.v.). Other works include *Le Balaïre d'Apollinaire* (1919), *Poèmes de Ronsard* (1925), *Trio* (1926), *Aubade* (for orchestra, 1929), a *marche militaire*, and sev. piano pieces.

Poulson, see POLESSEN LACEY.

Poultice (from the Lat. *puls*, pottage), application to some part of the body with the object of promoting counter-irritation in the case of inflamed tissues or organs, of relieving pain generally, of accelerating suppuration, or of stimulating or soothing the skin.

Poultry and Poultry Keeping. The keeping of poultry for the production of eggs and flesh dates from a remote period of civilisation. A theory shared by Darwin

was that all the domesticated breeds of poultry were derived from *Gallus bankiva*, a bird which inhabits N. India, Burma, Malay Peninsula, and the Malayan Archipelago, and though he admitted the lack of good evidence of the theory, he drew attention to the well-known tendency of many of the breeds, now widely different in external characteristics from *Gallus bankiva*, to revert to its type. Probably it occupied centuries of careful selection and breeding to produce a strain of birds capable of continued laying; but it is a remarkable fact that since breeding has been undertaken on modern scientific lines the average egg production has increased more rapidly in a half-century than in those many previous centuries. The ordinary fowl's yield of about 150 eggs in twelve months results in a profit after all charges are paid. To increase such an average yield for a large flock is to enhance the profits more rapidly than the expenses. Of the many factors which contribute towards profit on poultry, strain is the most important, for egg production is undoubtedly a Mendelian or inherited characteristic. Only the best layers, past their first moult, or, at least, in their second year, should be used in the breeding pen, and the male bird should come of a large egg-laying strain.

THE DOMESTIC FOWL. Breeds.—The most popular layers are Leghorns, Anconas, Light Sussex, and Rhode Is. Red, the last-named being a favourite. Two good cross-breeds are the Legbar, a cross between a Brown Leghorn and a Canadian Barred Rock, and a variety which is a cross between a Leghorn and a Rhode Is. Red.

Rearing.—When chicks are hatched out naturally by the broody hen (see below), the hen and her chicks should be housed in a fold with a portable run attached. When day-olds are purchased from a reliable breeder and no broody hen is available the chicks are reared in an artificial brooder, which has vents for the fumes of the oil lamp, and slides which are shut in with curtains through which the chicks can pass to and from the lamp. The temp. in the hover should be regulated according to the state of the chicks. If chicks are found to be always packed together more warmth is needed, if found standing around looking rather sleepy, less heat is required. Chicks are usually ready to be taken away from the brooder after five to seven weeks and moved to a larger house with a run. The next stage is when the pullets reach the point of lay period (five to seven months). Female poultry stock are advertised as (1) pullets (birds up to twelve months old); (2) yearlings (twelve to twenty-four months); and (3) hens (over twenty-four months).

Feeding.—Before 1939 a layer's food allowance normally consisted of 2 oz. of corn and 2½ oz. of layers' mash daily; thus six pullets needed nearly 12 lb. of food a week. The corn was given for one meal and the mash for another, usually the final meal before roosting; fresh greenstuff at midday and clean

water always are normal provisions. During the Second World War a rationing system was introduced in Great Britain, under which poultry keepers with twelve birds or less received a ration of 'balancer' meal made up of bran, dan, maize meal, meat and bone meal, ground oats, and wheatings; this is fed either morning or evening, or both, mixed with finely chopped household scraps. A plentiful supply of crushed oyster shell should always be available. This contains lime, and is essential to the welfare of the fowls and for the formation of the shells of eggs.

Accommodation.—Fowls with a free range, if active foragers, exercise themselves sufficiently, but those in confinement should be induced to exercise by the provision of a scratching shed. This is a shed with a well-lit floor and one side open to the S., but protected from driving rain by adjustable canvas screens. The floor, which preferably should be of rammed earth, is covered with a layer, 6 in. or more deep, of litter such as dry leaves, chopped straw, or peat-moss, and in this corn is buried, so that the fowls have to scratch for it. Devices exist for scattering the corn automatically at intervals, so as to economise labour. The house may be completed as a day and night house by being provided with perches at the back and wide boards, 9 in. below, to prevent the litter being soiled, and the necessary nest-boxes, one to every four birds, arranged with their entrances facing the wall, a raised shelf bearing a self-filling drinking vessel, and a spacious flat box containing fine dust, in which the birds can take their dust bath to keep down insects, complete the equipment of a type of house which is in favour with many successful poultry keepers and farmers. For sleeping accommodation only, almost any structure, if well-ventilated yet not draughty, can be utilised, provided it allows a minimum of 10 cub. ft. per bird of air space and is frequently lime-washed and disinfected. Innumerable failures in poultry keeping are due to foul ground; this is the case even on farms where, though the fowls have an unlimited range, they frequent one corner of a field near the homestead, the grain food being always thrown down there. Chicks and young birds must develop on clean, fresh ground. The confined runs of tens must be cleaned out daily, all objectionable matter being removed. Under the most cleanly conditions not more than six medium-sized fowls ought to be kept in a dry covered-in run 6 ft. by 12 ft. Once in six months the top inch of the rammed earth floor should be removed and used as manure, and every two years the run dug up. Grass is a valuable poultry food, and fowls are commonly kept on grass runs, but as it quickly becomes foul, the grass should be regularly mown and the runs vacated and rested every three months.

Laying Battery.—Under this system layers are confined in a cage of some 18 in. by 14 in. Although this is considered to be cruel by many poultry keepers the birds lay extremely well, and it also

enables the poultry keepers to note the bad layers. The cages are constructed so that the egg rolls gently down the sloping wire tray on which the bird stands to the egg rack in front. It is essential that the droppings boards or trays should be cleaned daily.

Broody Hens.—If the hen is required for 'sitting,' the setting of eggs (usually thirteen under large birds and nine or eleven under light strains) should be placed in proper nesting boxes in a quiet corner, and the hen fed once daily. The bird should come off the nest for 20 min. voluntarily each day, and care must be taken not to disturb it after it has been sitting for nineteen days. If the hen is not required to sit it should be placed in a small coop with a barred front and bottom, situated in full sight of the other birds, and fed well; as it is unable to sit comfortably the hen soon recovers from its broodiness.

Artificial Incubating.—There are many makes of incubators. The incubator must be placed in a well-ventilated position where there is no draught, and the heating apparatus regulated to maintain a steady temp. of 102° to 104° (see further under INCUBATION AND INCUBATORS).

Common Diseases.—The symptoms of abortion are the dropping of eggs, often shell-less. The affected bird should be isolated, with a nest in a corner, and given soft food with a little bicarbonate of soda in water. **Bumblefoot** is a growth under the ball of the foot, and must be treated by a veterinary surgeon. **Consumption** is a wasting disease and can rarely be cured, but cod-liver oil in meal and one or two quinine capsules sometimes overcome the tendency if treatment is commenced early. **Cramp** is usually caused by exposure to damp, saturated runs, etc. The legs should be plunged fairly frequently in a warm mustard bath and the bird kept in a dry warm house until improvement is obvious; the legs may also be rubbed with an embrocation. **Gapes** is caused by worms in the windpipe, and is frequently fatal. Camphor should be placed in water provided for the fowls, and for individual treatment a small quill feather should be stripped, moistened with turpentine, forced down the trachea (windpipe), and withdrawn with the worms attached. The symptoms of **rheumatism** are a swelling of the joints; treatment, as for cramp. **Roup** (q.v.) is a common contagious disease characterised by a thick discharge from the eyes and nostrils. Birds attacked should be placed in a warm, dry enclosure. The head should be cleaned with a disinfectant; the drinking water and soft food treated with proprietary preparations.

Table Poultry.—For this purpose white-skinned, big-breasted, quick-maturing birds are essential. At six months such birds are placed in a small pen and fed for two or three weeks from a trough containing a mixture of balancer meal, ample fat scraps, and potatoes. They are starved for 24 hrs. before killing. Cockerels not required for breeding pur-

poses are reserved for the table. Hens culled (i.e. thrown out) because their laying days are over are sold as boiling fowls.

Killing and Plucking.—In the case of chicks the bird is placed with its neck against the edge of a table or door; pressure by thumb-nail on the other side will sever the neckbone and cause instantaneous death. Cockerels and hens are taken by the legs, hanging head down, and gripped behind the head (back of head to palm of hand) with first and second fingers. The head is bent back firmly to part the neckbone just below the head and the bird plucked directly after killing. If the plucking be delayed the bird should be plunged into hot water, when the feathers will come away more easily.

Auto-sexing.—Experiments undertaken at research stations have enabled the sex to be determined by the plumage of the sex in the case of the Welbar, Legbar, Cambar, etc. (see also under SEX DETERMINATION).

DUCKS.—Of the many breeds of ducks (q.v.) the two which are most popular with domestic keepers are the Aylesbury, unsurpassed for table purposes, and Khaki Campbells, which are excellent layers and also good table birds. Ducks are hardy and can be kept profitably without a pond. If a duck-pond is constructed the sides should slope easily down to the water, the water being changed frequently. In a well-ventilated shed, with the floor well covered with straw in which the birds may lay their eggs, the ducks will lay almost daily.

GESE.—These are not popular with the domestic poultry keeper, largely because the goose is not a satisfactory 'sitter,' and then only four or five goose eggs can be hatched under one hen; goose meat, because of its richness, is not liked by many, and a good area of grassland is needed to keep them in good condition. The well-known breeds are Embden, Toulouse, and Roman; a cross between the Embden and Toulouse makes the best table bird (see also Goose).

TURKEYS.—These are really farm birds, and as such are not generally suited to the domestic poultry keeper (see under TURKEY).

GUINEA-FOWL.—Guinea-fowl (q.v.) are popular both for their eggs and flesh, but they do not thrive in close confinement and require a large range if they are to remain healthy. As a result, domestic poultry keepers do not often keep them.

See E. T. Brown, *The Poultry-keeper's Text-book*, 1948; C. E. Lee, *Profitable Poultry Management*, 1948; H.M.S.O., *Scientific Principles of Poultry Feeding*, 1948; 'Poultry World,' *Practical Poultry Keeping*, 1948, *Geese*, 1948, and *Ducks*, 1949; and G. R. Scott, *Secrets of Successful Poultry-keeping*, 1948.

Pound, Sir (Alfred) Dudley (Pickman) Rogers (1877-1943), Brit. admiral, son of Alfred John P. and Elizabeth Pickman Rogers of Boston, U.S.A. He entered the *Britannia* as a naval cadet, 1891; midshipman, 1893; sub-lieutenant, 1896;

lieutenant, 1898. In 1899 he specialised in torpedoes, all his seetime as a torpedo lieutenant being passed in flagships. On his promotion to captain in Dec. 1914 he was appointed naval assistant to the First Sea Lord (Adm. Fisher). In Oct. 1915, as captain, he took command of the flagship *Colossus*, the leader of the 5th Div. of the battle fleet in the battle of Jutland. From 1917 to 1919 he was director of operations (home) at the Admiralty, and from May 1925 to Jan. 1927 he was chief of staff to Adm. Sir Roger Keyes, commander-in-chief, Mediterranean, being promoted rear-admiral during that period. In 1927 he was made assistant chief of the naval staff, with a seat on the Board of Admiralty. Two years later he hoisted his flag on the *Hood* in command of the battle cruiser squadron, being made vice-admiral during the period of his command. From 1932 to 1935 he was Second Sea Lord and chief of naval personnel at the Admiralty. From June 1939 until his death he was First Sea Lord and chief of the naval staff. A capable officer and fine seaman, no other service chief of staff had held office continuously in time of war for so long a period. His outstanding services were recognized by the award of the O.M. in Sept. 1943.

Pound, Ezra Loomis (b. 1885), Amer. poet, oriental and medieval scholar, b. in Hallett, Idaho. He was educated at Pennsylvania Univ. and settled in Europe in 1907, travelling widely in England, Italy, and France. P. was one of the founders of the Imagist school of poetry, and probably not only the best of them, but also the most scholarly. His knowledge of medieval literature is profound. His early books—*Evolutionism* (1909), *Persone* (1910), and *Lustra* (1918)—show the results of his studies. Not only does he give in free verse lovely rhythmic inventions of his own, but also masterly trans. from the Provencal songs of the troubadours. He has trans. many works of the Chinese, Lat., It., and Fr. poets. Some of his own poems are hauntingly beautiful, and full of experiments, while at other times he is a savage satirist. Among his prose writings are *Indiscretions* (1923) and *Imaginary Letters* (1930). P. broadcast from Italy during the Second World War, and was later accused of treason by the U.S. Gov. In 1946 he was declared mentally unsound and was confined in an asylum. In 1948 he was awarded the Bollington prize for his *Pisan Cantos*, written while he was in the asylum. While there he also trans. the odes of Confucius. See T. S. Eliot, *Ezra Pound, His Metric and Poetry*, 1917, and A. S. Amund, *The Poetry of Ezra Pound*, 1937.

Pound (Saxon *pyridan*, to confine), enclosure in which cattle or other beasts are confined when taken trespassing or going at large contrary to the law. See pound breach under BREACH.

Pound, unit of weight. The Eng. unit of weight is the P. avoirdupois of 7000 grains divided into sixteen ounces. It was made the legal unit of weight in 1855. The P. troy consists of 5760 grains, and

is used for gold and silver, platinum, and precious stones; also in dispensing medicines.

Poundal, in dynamics, unit of force in the foot-pound second system, is that force which, if acting for one second, will produce in one pound a velocity of one foot per second.

Pounds, John (1766–1839), Brit. philanthropist, b. in Portsmouth. Being crippled for life by an accident in 1781, he became a shoemaker and set up business for himself in 1803. In 1818 he began to teach poor children, and from that time became famous as a teacher and friend of the poorest, being the originator of ragged schools (*q.v.*). After his death schools were estab. as memorials of his achievement.

Poushkin, see PUSHKIN.

Poussin, Nicholas (c. 1594–1665), Fr. painter, b. at Les Andelys, Normandy. He studied under Quentin Vrai of Amiens and Ferdinand Elle, a Fleming, and in 1624 went to Rome, where he studied the works of Raphael. He has been called the 'Raphael of France.' He excelled as a painter of hist. and landscapes. The noble construction of his designs may be better seen in engravings than in the originals, where often the colour has changed in parts. Among his chief pictures are the 'Triumphs of Flora,' a 'Bacchanal,' 'Massacre of the Innocents,' the 'Last Supper,' the 'Labours of Hercules,' the 'Triumph of Truth,' and the 'Holy Family.' See studies by P. Desjardins, 1903, and W. Friedländer, 1911.

Pout, see BIR.

Powan, see CORLIGON(S).

Powder Metallurgy, see under METAL-LURGY.

Power. A P. is an authority reserved by or limited (*see* LIMITATION) to a person to dispose, either wholly or partially, of real or personal property either for his own benefit or for that of others. The word thus specialised is highly technical, and the idea underlying it must not be confused with the dominion exercisable by a man over his own property by virtue of ownership. Usage has sanctioned a classification of P.s. into (1) Common law P.s., i.e. either bare authorities by one person to another to do an act for him, or P.s. coupled with an interest. Examples: A P. of attorney (*q.v.*); a declaration in a will by a testator that the executors may sell the land, by virtue of which P. the executors can pass the legal estate to the purchaser. (2) Equitable P.s., or those which affect the equitable as opposed to the legal interest or estate in property (*see* EQUITY); the commonest example is the ordinary P. of appointment among children in a marriage settlement (*see* LAND LAWS), where personality (*see* PERSONAL PROPERTY) is vested in trustees. A 'general P. of appointment' is one whereby the donee of the P. can appoint whom he will as owner of a particular fund or other property; a 'special P.' is one whereby he can only appoint some or all of a specified class of persons (usually children or other issue to be provided for in a marriage settlement). (3) P.s. oper-

ating under the Statute of Uses, or Ps. of revoking or declaring future uses vested in some person named for that purpose in the deed by which the uses to be affected by the operation of the P. are created. The commonest instances of the exercise of this cumbersome device for getting over the technical difficulties of common law conveying rules are the Ps. of sale and jointuring (see JOINTURE) in a marriage settlement.

Power, see AIR ENGINE; GAS ENGINES; GEARING; HORSE-POWER; MECHANICS; TUBES (PNEUMATIC).

Power of Attorney, authority by one person, called the donor, to another, called the donee, under which the latter becomes authorised to act as the agent of the former. It is by no means essential that a P. of A. should be given by any formal instrument, but in practice the authority is always embodied in a deed poll of indenture. Where the authorisation is to act for the donor in all matters, or in all matters relating to a particular business, it is called a *general P. of A.*; where the donee is only authorised to do some specified act the P. of A. is called a *special power*. Ps. of A. are construed strictly, and give such authority only as is conferred expressly, or is by implication clearly necessary for the due execution of the powers expressly conferred. The stamp duty on a P. of A. to a person to vote as proxy is 1d.; on a P. of A. for any purpose not specifically described in the Stamp Act, 1891, 10s.; but proxies given by creditors or contributors in bankruptcy and winding-up proceedings are exempt.

Power Stations, see ELECTRICAL POWER GENERATION.

Powieke, Sir Frederick Maurice (b. 1879), Eng. historian, b. at Alnwick, and educated at Owens College, Manchester, and at Balliol College, Oxford. He was a fellow of Merton College from 1908 to 1915, and was made an honorary fellow of Merton in 1922 and of Balliol in 1939. After holding chairs of hist. at Queen's College, Belfast, and at Manchester Univ. he was regius prof. of modern hist. at Oxford from 1928 to 1947. He was president of the Royal Historical Society from 1933 to 1937. In 1946 he was knighted. A brilliant medievalist, P.'s influence at Oxford did much to maintain and increase the keen interest in medieval hist. for which that univ. is famous. He stressed the importance of spiritual values in hist., and, while encouraging the new emphasis on economic factors, helped to ensure that they did not, at Oxford, flourish to the exclusion of the spiritual. His *Henry III. and the Lord Edward* (1947) was an outstanding monumental study of a period of Eng. hist. which had not previously been thoroughly explored in Eng. Among his other publs. are *The Loss of Normandy* (1913); *Aired of Riccardi* (1922); *Stephen Langton* (1928); *Christian Life in the Middle Ages* (1935); and *The Reformation in England* (1941).

Powis, Earls and Marquesses of, descended from the first earl (second 'Her-

bert' creation) of Pembroke, whose son Sir Edward Herbert in 1587 purchased P. Castle, Welshpool, from Edward Grey, feudal lord. Sir Edward's son Wm. became Baron P., 1629. Wm.'s grandson, third baron, was made earl 1674, marquess 1687. His honours became extinct on the death of the third marquess, 1747-48. A descendant of a younger brother of Sir Edward was made earl, 1748; his honours became extinct on the death, 1801, of his son, whose sister had married Edward, second baron Clive (1754-1839)—who was in 1804 created earl of P., and whose son and successor took the surname Herbert. When the last-named earl's son and successor died, 1891, the earldom passed to his nephew George Charles, styled third earl, b. 1862, a son of Lt.-Gen. Sir Percy Egerton Herbert.

Powlett, or Pawlett, Charles, see BOLTON, DUKE OF.

Poyning, Sir Edward (1459-1521), Eng. statesman, b. in Southwark. He led the rising in Kent in 1483. He fled to the Continent, but returned with Richmond, afterwards Henry VII., in 1485. He subsequently became lord-deputy of Ireland (1491). In this capacity he convoked a Parliament which passed 'Poyning's Law' (1495), enacting that no law could be valid in Ireland until it received the sanction of the Eng. king and council. P. defeated Perkin Warbeck and crushed the Yorkist cause in Ireland.

Poynter, Sir Edward John (1836-1919), Eng. painter, b. in Paris. He studied art at Rome under Leigh, 1854; in England under Dobson, 1854-56; and in Paris under Gleyre, 1856-59. He was shade prof. of art at Univ. College, London, 1871-75; became an R.A. in 1876; and director of the art dept. at S. Kensington and prin. of the National Art Training Schools there, resigning in 1881. P. succeeded Burton as director of the National Gallery, 1894-1905, he made the Tate Gallery a dept. of it. He ed. the *Illustrated Catalogue of the National Gallery* (1889-1900). From Millais' death (1896) he was president of the Royal Academy. He was knighted in 1896 and created a baronet, 1902. He became a G.C.V.O. in 1918. P. designed the cartoons for the mosaic panels of 'St. George' and 'St. David' in Westminster Palace (1870), and of 'Apelles' and 'Phidias' in the Victoria and Albert Museum. His pictures include 'Israel in Egypt' (1867) and 'Atalanta's Race' (1876). He pub. *Ten Lectures on Art* (1879).

Poynting, John Henry (1852-1911), Eng. physicist, b. at Monton, near Manchester, educated at Owens College and Trinity College, Cambridge. Formulated P.'s theorem in 1884, proving that the flow of energy could be expressed by a formula in terms of the magnetic and electrical forces—a point.

Požarevac (Ser. Passarowitz), tn. of Serbia, Yugoslavia, 37 mi. from Belgrade. It was the scene of the peace of Passarowitz (1718) between Charles VI. and Venice on the one side, and Turkey on the other. Pop. 16,100.

Poznan (Ger. *Posen*): 1. Prov. of Poland. It is situated in the N. Ger. plain, and is watered by the Warthe (Warta), Proсна, Obrá, and Netze. Agriculture is the prin. industry, and great attention is paid to stock-raising. The chief manufs. are machinery, tobacco, beet-sugar, bricks, cloth, and leather. Lignite and salt are mined. The most notable tns. are P. and Bydgoszcz (Bromberg). It belonged to Prussia from the time of the partitions of Poland in the eighteenth century until 1918, when most of P. was returned to Poland. The remainder was transferred to Poland in 1915. Area 11,947 sq. m. Pop. 2,115,000. 2. Cap. of the above, situated at the confluence of the Warthe and Cybina, a fortress of the first class, and an archiepiscopal see (since A.D. 1000). The most interesting buildings are the Gothic cathedral with its 'Golden Chapel,' old tn. hall, and Raczynski palace. The tn. has important manufs., distilleries, flour mills etc. A univ. was founded in 1903. Pop. 297,000. See W. Maas, *Die Entstehung der Posener Kulturlandschaft*, 1927.

Pozoblanco, tn. of Spain in the prov. of Cordova, situated in a rich lead-mining dist. There are noted cattle fairs, and manufs. of leather and woollen. Pop. 19,800.

Pozsony, see BRATISLAVA.

Practice, in arithmetic, name given to a rule or method which shortens the operation of compound multiplication, e.g. find the price of 85,764 articles at £3 15s. each:

£ 85,764 is the cost at £1		
257,292	" "	3
42,882	" "	10s. (¼ of £1)
21,441	" "	5s. (½ of 10s.)
<u>321,615</u>	" "	<u>3 15s.</u>

Practice and Procedure (in law), see ACTION; CRIMINAL LAW; EVIDENCE; INJUNCTION; INTERLOCUTORY PROCEEDINGS; PLEADINGS; PROCESS (in law); PROOF; SPECIFIC PERFORMANCE; SUMMONS; WRIT.

Practitioner, see MEDICAL PRACTITIONER.

Prado, Museo del, state gallery of Madrid. It houses the most important Sp. art collection, over sixty of the works of Velazquez being there. Raphael, Titian, Rubens, and Goya are also well represented. There are paintings by Correggio, Giorgione, and El Greco, and a large Flem. collection. See also NATIONAL GALLERIES, European Galleries of Paintings. See *The Prado Treasure House of the Royal Spanish Collections*, 1940.

Præd, Winthrop Mackworth (1802-39), Eng. poet b. in London, and educated at Eton and at Trinity College, Cambridge, where he became noted for his Gk. and Eng. verse. He was called to the Bar in 1829, and later took up political life. He was one of the prime movers in establishing a national system of education. His poems are marked by grace, wit, and delicacy of style and finish. An author-

ised ed. of his poems, with a memoir, appeared by D. Coleridge in 1861.

Præfect, name of various Rom. magistrates. The original *præfectus urbi* or *custos urbis*, created by Romulus and chosen from among the senators, only exercised his functions in the king's absence, when he could convolve the Senate or hold the Comitia. Under Augustus he had beneath him the *miles stationarii*, and kept peace and order in the city. Officers who controlled or superintended some particular dept. were also called *præfecti*.

Præfloration, see ESTIVATION.

Præmonstratensians, see PREMONSTRATIENSIS.

Præmunire, name of a medieval writ taking its title from the opening words *Præmunire facias* (cause to be forewarned). The name came to be applied to the offences prosecuted by such a writ and to the penalties incurred. In this way the name P. came to be given to sev. Eng. laws passed in the later Middle Ages for the purpose of restricting papal authority in England. The first of these statutes of P. was passed in 1353, but that which is usually known as the statute of P. was a law passed in 1392, forbidding the obtaining of bulls from Rome. After the Reformation many further types of offence were made subject to the penalties of P., e.g. such penalties were attached to the Habeas Corpus Act of 1679.

Præneste, see PALESTRINA.

Præsepe, beautiful star cluster, commonly known as the Beehive, in the constellation of Cancer. It is just visible to the naked eye, and a small telescope or a pair of binoculars will show the individual stars. Next to the Pleiades it is the most conspicuous of the star-clusters.

Præsidium Julium, see SANTAREM.

Præsidium, see DIDYMIUM.

Prætor (*prætor*, one who goes before), originally a title designating the Rom. consular leader of the army (Gk. *ἀρχηγός*). After 366 B.C. it was applied to the annually elected curule magistrate, who administered justice and was subordinate to the consuls. The office was thrown open to the plebeians by 337. By 246 there were two Pn. (*urbanus* and *peregrinus*), the number later increasing to eighteen under Nerva. There were eight, sixteen, and twelve under Sulla, Julius Caesar, and Augustus respectively. They were attended by lictors. Under the empire one of their chief functions was the management of the games. Prov. governors were of prætorian rank. In later times the word came to mean mayor or chief magistrate, the It. *podestà*. See Labatut, *Histoire de la Præture*, 1868, and Mommsen, *Römische Staatsrecht* (II.), 1887.

Prætorian Guard, or **Prætoriani**, imperial bodyguard in anc. Rome instituted by Augustus (3 B.C.), consisting of nine (later ten) cohorts of about 1000 men each, horse and foot, commanded by a tribune. They had higher rank and pay than the legions, and their term of service was sixteen years. They came to possess an

almost acknowledged right to choose the new emperor. These cohorts which were stationed in Rome were collected into the famous 'praetorian camp' in Tiberius's reign. Constantine finally suppressed them (A.D. 312). The name *praetoria cohorts* had been applied earlier under the republic to select troops attendant on the praetor or general of the army. See also ROMAN ARMY.

Pragmatic Sanction (Gk. *πράγμα*, business), solemn ordinance or imperial rescript. The term *pragmatica sanctio* was used in late Rom. law, and continued to be used in the legal phraseology of the Middle Ages and of modern Europe, particularly of a decree that defined the powers of a sovereign. The most important decrees in European hist. which have been so named are that of Bourges, in which Charles VII. defined the pope's power within the Fr. dominions (1437); of Charles VI. of Germany, in which he settled his succession on Maria Theresa (1713); of Naples, when that kingdom was made over by Charles III. of Spain to his third son (1759). The term P. S. has since the rise of modern constitutional govts. become little more than historic.

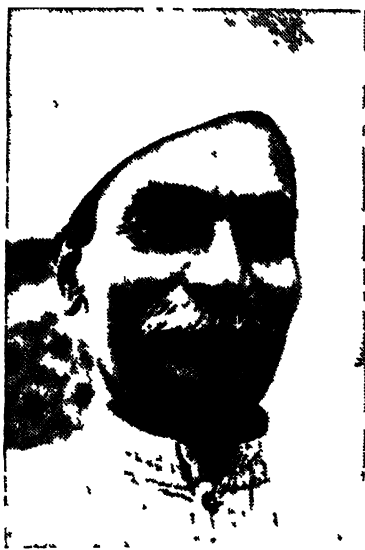
Pragmatism, or **Humanism**, is almost entirely a product of later thought. It was first clearly defined by Peirce, but only during later years did it become recognised as a distinct system of philosophy—a development due mainly to Profs. James (Harvard) and Dewey (Columbia). P. may be defined as the philosophy of the expedient; it refuses to recognise as ultimate the ordinary and accepted truths of metaphysics, and confines itself wholly to those truths which are definitely correlated to the actual facts of existence. Since the relation of such truths with facts is liable to constant growth and change, truth thus becomes an intellectual expedient just as right is a moral expedient. One must avoid the error, however, of regarding P. as a form of Positivism (q.v.) in spite of the superficial similarity in many respects. P. contends that truth *happens* to an idea by force of circumstance, and that ideas are true only when they can be 'assimilated, validated, corroborated, and verified.' Thus the expression of truth is limited to broadly realistic lines, and the vague idealistic suggestions of certain schools of metaphysics discarded as intrinsically false. See W. James, *Pragmatism*, 1907, and *The Meaning of Truth*, 1909; and Schiller's works on Humanism, 1903, 1907.

Prague (Czech, *Praha*), cap. of Bohemia and of the republic of Czechoslovakia, and one of the most anc. cities of Europe, is built partly in a valley and partly on the inclines of various hills, through which the R. Vltava or Moldau cleaves its rugged course. It is a picturesque tn., containing many buildings of great architectural beauty, abounds in palaces and towers, and has sev. handsome bridges spanning the riv., which separates the old tn. from the new. Old P. is predominantly Gothic in style, but its baroque buildings, chiefly palaces, are some of the finest examples

of baroque in Europe. Among its chief buildings are the Royal Palace (fourteenth century), the cathedral of St. Vitus (1484), containing the reliquary of St. Wenceslas, the Nostic Palace, the Waldstein Palace, the palace of Count Clam-Gallas, the Czernin Palace on the Hradschin Hill, the Kinsky Palace, and many others. Its churches and monasteries are very numerous, the first in importance being the Tyn (Hussite) Church (fourteenth and fifteenth centuries), in the market-place of the old tn., which contains the tomb of Tycho Brahe (q.v.). Another fine church is that of St. Nicholas, erected in the seventeenth century. The most anc. monastery is that of Mt. Zion or Strahov, founded in 1142 during the reign of Vladislav I.; others are the Capuchin and the Emaus monasteries. One of the two old tn. halls, which had a famous clock (1381-1480), was one of the few old buildings in Prague which was destroyed in the Second World War. There is a univ., with 18,900 students in 1947, founded in the fourteenth century, of which John Huss was rector in 1402; there is an observatory attached to it. There are numerous parks and theatres, and a stadium. Modern P. is a commercial centre of great importance. According to tradition P. was founded in the eighth century by Libusa, the youngest daughter of Krok or Crocus, the earliest sovereign of Bohemia. It became a Ger. settlement early in the twelfth century, and a large Ger. element remained in P. until after the First World War. It suffered severely at the hands of the Hussites in 1421, and the battle of White Mt. (1620), during the Thirty Years war, was fought outside its gates. The Swedes gained possession of the tn. in 1648, and it was taken by the Fr. in 1741 and by the Prussians in 1744, who also besieged it in 1757. In the war of 1866 it was again occupied by the Prussians and the treaty of peace was signed here. In Oct. 1918 the declaration of national independence was made in P. It was occupied by the Gers. in March 1939 and liberated by Amer. and Russian troops, aided by a rising by Czech partisans within the city, on May 10, 1945. On May 26, 1942, Reinhard Heydrich, deputy protector of Czechoslovakia, was assassinated in the suburbs of P. In Feb. 1948 the *coup d'état* which placed Czechoslovakia under Communist control took place in P. P. is a Rom. Catholic archbishopric. It is the most important junction of the Czechoslovakian railways. P. manufs. machinery, textile and leather goods, and paper, and has brewer., iron foundries, and chemical works. Pop. 924,000. See A. Exax and F. Hlavas, *Prag in Bildern*, 1928; C. Holland, *Czechoslovakia: the Land and its People*, 1931; and O. Schuorcr, *Prag Kultur Kunst. Geschichte*, 1939.

Praha, see PRAGUE.
Prahlín Island, see under SEYCHELLES.
Praia, cap. of the Cape Verde Is., on the S. coast of Santiago Is. It exports grain, coffee, and medicinal products. Cinchona is grown in the vicinity. Pop. 6000.

Prairie (Lat. *pratium*, meadow) vast tract of land usually level in character, covered with grass but devoid of trees, in temperate regions. Such areas of land are common in the U.S.A. and in the P. provs. of Canada. Some P.s. are great wheat growing areas. In other parts stock raising is the chief occupation.



Ind in G. ernment

DR. RAJENDRA PRASAD

Prairie-dog, or **Prairie Marmot**, term applied to any of the four species of rodents in the squirrel family *Sciuridae* and genus *Cynomys*. They are burrowing animals, averaging about a foot in length and have the curious habit of dwelling in friendship with the ground owl and rattlesnake. All are found exclusively in N. America.

Prairie-hen, or *Impanichus americanus*, galliform bird of the family Phasianidae and subfamily Tetraoninae to which belong the grouse and partridges, the term is also applied to *Tetrao cupido*, a reddish brown bird which is a near ally of *T. americanus*. Both species are natives of N. America.

Prairie State, see ILLINOIS.

Prairie Wolf, see COYOTE.

Prakrits, Indian, see under INDO-EUROPEAN LANGUAGES.

Pralltriller, musical ornament which when placed over a note indicates that this note should be struck twice in rapid succession with a note a degree higher or lower in between, according to the sign ♯/W in the former case ♯/W in the latter.

Prambanan, see BRAMBANAN.

Prasad, Rajendra (b. 1884), Indian nationalist political leader, b. in a vil. in the Suran dist., Bihar. He became a member of the All India Congress Committee in 1912, and practised law in the Patna high court in 1920. He gave up his practice and joined the non-cooperation movement supporting Gandhi in the Champaran agrarian agitation. P. became a member of the working committee of the All India Congress in 1922, and was president of the Congress 1934. He was chairman of the Constituent Assembly, and his firm yet conciliatory handling of its debates during the years 1946-49 endeared him to the back benchers and it was to them mainly that he owed his election (uncontested) as first president of the republic of India (proclaimed on Jan. 26, 1950). Prior to the proclamation India was a dominion whose governor general was Dr. Rajagopalachari. The latter declined to stand for election as president.

Prase, lark green chalcidony. The name is also given to quartz of the same colour.

Praseodymium, metallic chemical element symbol Pr atomic weight 140.9 atomic number 59 discovered in 1885 by Auer von Welsbach. It belongs to the group of rare earth metals and occurs in monazite and similar minerals. P. is a scarce element and its compounds are difficult to purify.

Prato, tn. in the prov. of Florence, Italy, 11 m. N.W. of the city of Florence. It is enclosed by walls and has a citadel, and the prin. edifices are the twelfth-century cathedral, the interior of which is decorated with beautiful frescoes and reliefs, the fifteenth century Madonna delle Grazie church and a tn. hall with picture gallery and public library. There are manufs. of textiles, straw wine flasks, machinery, etc. and there are serpentine quarries in the near neighbourhood. During the Second World War there was severe street fighting in P. between Sept. 6 and 10, 1944, between Ger. and Amer. troops. The cathedral was slightly damaged, the loggia of the cloister was destroyed. The church of St. Bartolomeo and the house of Filippo Lippi were also demolished. Pop. 76,600. See M. R. Gabrielli, *Guida di Prato* 1927.

Pratt, Charles, see (AMERICAN), LAROF.

Prawn, term applied to the shrimp like decapod crustaceans in the family Palaemonidae but especially to *Palaemon* (or *Leander*) *seratus* which furnishes the edible P. It is from 3 to 4 in. long, has a long serrated rostrum of a pale red colour, and is often found near rocks on Brit. shores. In America the name is applied to scv. shell fish but in particular to *Penaeus esculentus* and *P. brasiliensis*. See CRUSTACEA.

Praxiteles (fl. c. 364-330 B.C.), Gk. sculptor. His chief works have perished, including the 'Aphrodite' of Cnidus (for which Phryne was probably his model). This was ranked in antiquity next to the 'Zeus' of Pheidias at Elis. It was destroyed by fire in A.D. 475, but a copy exists in the Vatican. Other works were

a 'Satyr,' 'Eros of Theopias,' and 'Apollo Sauroctonos.' His 'Hermes' was found in the Ilerum at Olympia (1877). The Basis from Mantinea, representing the contest of Apollo and Marsyas, is also ascribed to him. See Pliny, *Ist. Nat.*, xxxiv. and xxxvii.; C. O. Müller, *Archäologie der Kunst*, 1835; A. Furtwängler, *Masterpieces of Greek Sculpture* (Selliers's trans.), 1895; W. Klein, *Praxiteles*, 1898; and study in *Plo Arte* by K. Schefold, 1915.

Prayer (Lat. *precari*, to implore, entreat), in religion, in the broadest sense of the word, signifies the lifting up of the heart towards God, or some spiritual being believed to have power of intercession with God. P. is therefore essentially an act of religion and is found wherever there is belief in a personal divinity or divinities. P. in primitive religions is devoted almost entirely to the securing of temporal benefits, such as health, good crops, success in war, and, in connection with these, the blessing and the curse. Religions of high culture, however, understand P. in a much wider sense. For them it includes not only petitions but also acts of adoration; love, thanksgiving, and atonement. The teaching of Jesus Christ emphasised the essentially spiritual nature of P., and gave the 'Our Father' as a model for all his followers. Types of P. may be classified as public or private, oral or mental. Christian public P. includes the liturgy, the Divine Office recited by monks, cathedral choirs, and others in common, and other forms of divine service. Private P. may be oral or mental. Oral, of course, implies sufficient attention and intention to make it a human act. But mental P., *par excellence*, consists in meditation on some religious truth leading up to wordless intercourse with God. This meditation may be superseded by affective P. in which the preparatory work of the intellect is reduced to a minimum. Affective P. in turn may be superseded by the P. of Quiet, in which the whole soul rests in contemplation of God. This contemplative P. has many degrees and many names. See (Protestant authors) J. E. Liddon, *Some Elements of Religion*, 1872; Clarke, *Christian Doctrine of Prayer*, 1874; Newman Hall, *Prayer: its Reasonableness and Efficacy*, 1875; L. D. Weathered, *Healing through Prayer*, 1946; H. T. Hughes, *Prophetic Prayer*, 1947; and V. L. Johnstone, *Learning to Pray with the Church*, 1949. (Catholic authors) St. John of the Cross, *Spiritual Works* (trans. by Allison Peers, 1913); Ludovic de Berse, *The Science of Prayer* (trans. 1925); J. Grou, *How to Pray* (trans. 1901); and P. Boylan, *Difficulties in Mental Prayer*, 1915.

Prayer Beads, see ROSARY.

Prayer, Book of Common, authorised service book of the Church of England. The B. of C. P. and administration of the Sacraments, and other rites and ceremonies of the Church, according to the use of the Church of England, is adequately described in its title. The purpose of its compilation is clearly explained in the

preliminary dissertation 'Concerning the Service of the Church' which first appeared in the book of 1549, and which has remained at the head of the P. Book ever since that date. The preface gives the following reasons why a new B. of C. P. was required: (1) that the Lessons and Psalms might be better arranged, that the number of feast days might be reduced, and that legendary matter might be removed; (2) that Eng. might be substituted for Lat.; (3) that one uniform use might be set up instead of the variety of uses that had before obtained. In the early Eng. Church there was no rigid uniformity in the service-books. Printing was not in use, and different reforms were made along different lines in various parts of the country. There was always, however, a distinct trend in the direction of uniformity, and in time, as certain cathedral churches and monastic houses rose into greater prominence, they began to be copied in the dists. all round them. The P. Book speaks of the uses of Salisbury, Hereford, Bangor, York, and Lincoln, but it is important to remember that the first of these was more important and widespread than all the others put together. It formed, indeed, the basis of the revised P. Book. Successive stages in the progress of this revision, as the Reformation went on, may be given shortly as follows, in order of date; 1544, a Litany in Eng. pub.; 1548, 'The Order of the Communion' pub., an Eng. form of Communion in both kinds to be inserted in the Lat. service; 1549, the first P. Book of Edward VI., containing the order for Morning and Evening Prayer, etc., on the plan of the present P. Book; 1552, the second P. Book of Edward VI. was issued but only remained in use for about eight months. On the accession of Mary the Lat. services were restored. In 1559, the year after the accession of Elizabeth, a revised P. Book was issued, modifying some of the statements of the 1552 book in favour of a more Catholic interpretation. The 1552 book had been compiled while the influence of the foreign reformers was most strong, and it was this version which came closest to the ideas of continental Protestantism. Elizabeth's P. Book was, in all essentials, the P. Book as it exists to-day. The preface proclaimed that the policy of the Church of England was 'to keep the mean between the two extremes.' It seems certain that the moderation of the Elizabethan B. of C. P. was a prime factor in winning the majority of the Eng. who had been known as devout Catholics, away from Rome. On the other hand, its deliberate ambiguity on certain fundamental issues probably ultimately endangered the Elizabethan settlement, and has led to there being, almost continuously from 1559, two opposing sections in the Church of England, each arguing its own interpretation of the disputed passages. The Elizabethan compromise was never universally accepted. The ornaments rubric was set aside from the first; the use of the surplice could only be enforced with difficulty. In spite of such concessions,

the Puritan party became increasingly hostile. The hist. of Elizabeth's reign is, to a considerable degree, the hist. of a relentless conflict between Puritanism and churchmanship, with the Prayer Book as the chief battleground. As a result the Prayer Book became one of the issues over which the Civil war was fought. In 1645 it was suppressed by Parliament, and its use was made a penal offence. In 1660, however, it was restored, and at a last revision some six hundred minor alterations were made, including the addition of the last part of the Catechism, dealing with the Sacraments, the separation of the Catechism from the Confirmation service, the use of the word 'priest' rather than 'minister' in sev. places, and the addition of 'the commemoration of the departed' in the Prayer for the Church Militant. But it was still the book of 1552 rather than that of 1549.

After the beginning of the nineteenth century agitation to revise the B. of C. P. received an impetus due mostly to the conviction that the social and mental development of the civilised world had created a need for a Prayer Book that should be more closely in touch with the people, and which would be able more intimately to enter into their ordinary lives. The agitation was not confined to any particular country, but arose in England, Scotland, Ireland, America, S. Africa, and Canada. The bitter arguments between High and Low Church parties in the preceding century had also suggested that sev. disputed sections of the B. of C. P. should be more clearly defined. In England deliberations took place by a specially appointed convocation between 1906 and 1920, and final proposals drawn up by the Church Assembly were considered by the Houses of Clergy and Laity. They were handed to the bishops for final revision. In 1927 the proposed alterations were placed before Convocation. They included the omission of certain rubrics concerning Holy Communion, Public Baptism, Confirmation, and the Solemnisation of Matrimony. The Ordinal of 1662 was replaced by that of 1927, and many occasional prayers were added, while portions of the Psalms were allowed to be omitted. The revision was, in fact, a move much nearer the B. of C. P. of 1549. Most support came from the Anglo-Catholics, and the book was passed by the House of Lords. But the House of Commons definitely rejected it, and the bishops drew up an amended list of changes, thereby alienating many former supporters among the Anglo-Catholics. But the Church Assembly approved the amended ed., and it was once more brought before Parliament, only to be rejected again. Since then the use of many passages in the rejected version has been sanctioned by some bishops. Special services in commemoration of the fourth centenary of the first Eng. Prayer Book were held in 1949. Although there are divs. of opinions even among Anglicans on some of the liturgical aspects of the B. of C. P. in its present form, it is universally agreed that the beauty of its

language is outstanding, and has exercised an incalculable influence upon Eng. thought and writing during the past four centuries, far beyond the confines of Anglicanism (*q.v.*). See F. Procter and W. H. Frere, *New History of the Book of Common Prayer*, 1901, and *Report of Convocation*, 1927; C. S. Phillips, *The Background of the Prayer Book*, 1938; M. M. Knappen, *Tudor Puritanism*, 1939; W. K. Lowther Clarke, *The Prayerbook of 1528 Reconsidered*, 1943; and F. Moyle, *The Book of Uncommon Prayer*, 1949.

Praying Mantis, see under MANTIS.

Preaching (Lat. *prædicare*, to proclaim), public proclamation of some religious belief, delivered with the object of exhorting or converting. It has played a vital part in the hist. of Christianity, but is used in other religions. The O.T. prophets were preachers; in the N.T. John the Baptist preached the coming of the Messiah and summoned men to repentance. Christ Himself delivered many sermons, the most famous being the Sermon on the Mount. Examples of apostolic P. are preserved in the report of St. Peter's sermon on the day of Pentecost (Acts ii. 14 ff.) and that of St. Paul on Mars Hill (Acts xvii. 22 ff.). The proclamation of the Gospel remains the chief element of P., but in an organised Christian community, the exposition of the truth, and the illustration of its bearing on character and conduct, became increasingly important. Some of the fathers of the Church preached a great deal, but by St. Jerome's time it had become customary to read the written discourses or 'homilies' of the holy fathers in the regular meetings of the Church which had no competent preacher. Later the Venerable Bede's works were frequently used thus. The missionaries from the Scottish and Irish monasteries who carried Christianity all over Europe were a group of preachers. Of medieval Fr. sermons, those of Maurice de Sully (*d.* 1196) provide the first authentic examples of homilies in the vernacular. In Germany, in the mid-thirteenth century, P. became an agency of great power in the life of the country, the preachers being prin. founders of Ger. prose style. Among the most noted were Berthold von Regensburg, the Franciscan (*q.v.*), and Meister Eckhart (*q.v.*). In England the stress laid upon P. by the mendicant orders can be gauged by the architectural developments of the time, with the emphasis on a large nave, capable of holding a big congregation. Wycliffe (*q.v.*) realised the power of P. and emphasised its importance. During the Reformation Luther, Knox, and Latimer made full use of the impassioned personal appeal to establish their doctrines. Protestants, especially nonconformists, made the sermon an essential part of their services. The Catholic counter-Reformation realised the value of P., and the Jesuits laid stress on it in their training. One of the greatest Fr. preachers was Bossuet (*q.v.*) whose sermon on the extent and limits of papal authorities (1681) is a masterpiece of Fr. prose. P. was a leading feature of the Eng. religious

revival of the eighteenth century. John Wesley's (q.v.) oratory was colloquial, terse, and homely, and George Whitfield (q.v.) was able, by a combination of fervour, dramatic action, and homely pathos, to hold the attention of an outdoor audience for long periods. In the nineteenth century famous preachers included Edward Irving (q.v.), J. H. Newman (q.v.), H. P. Liddon (q.v.), C. H. Spurgeon (q.v.), and Joseph Parker (q.v.). During the twentieth century the sermon became generally much shorter, lasting only about a quarter of an hour, as compared with the three-hour sermons of previous centuries. The broadcast sermon became important after 1920: by it preachers like H. R. ('Dick') Sheppard (q.v.), and W. H. Elliot became known to thousands outside their own par. Other prominent contemporary preachers include L. D. Weatherhead, W. E. R. Sangster, and R. A. Knox (q.v.). See G. R. Owst, *Preaching in Medieval England*, 1926; D. B. Knox, *Handbook for Speakers and Preachers*, 1936; F. A. Tatford, *The Art of Preaching*, 1936; E. Vuast, *Lacordaire et les conférences de Notre Dame*, 1937; H. G. Pfander, *The Popular Sermon of the Medieval Friar* (2 vols.), 1937; and T. H. Hughes, *The Psychology of Preaching and Pastoral Work*, 1939.

Preaching Friars, see under DOMINIC, ST. Prebend, term formerly denoting the food, clothing, etc., of a secular priest or canon regular, or the endowment from which this was provided, as distinct from the income of a benefice. Later it was applied to the endowment possessed by a cathedral or collegiate church for the support of a canon residentiary, who was in consequence known as a prebendary. To-day the P. is generally an honorary office, and the prebendary is then not a member of the cathedral chapter, and does not receive a stipend.

Pre-Cambrian, term for all rocks older than the Cambrian. The oldest of all are also called Archean or Laurentian. Lying below the Cambrian beds containing *Olenellus trilobites* they comprise igneous and sedimentary rocks, mostly highly metamorphosed, exposed over one-fifth of the present land surface, including nearly 2,000,000 sq. mi. in Canada and large areas in the N.W. of Scotland. Both Cambrian and P.-C. rocks, however, are classified among other rocks of the Primary or Palaeozoic period.

Precedence depends partly upon letters patent and statute and partly upon ancient custom. In England questions of P. are generally referred to those officers of the council of the earl-marshal of England to whom is assigned the arrangement of public processions on state ceremonial occasions. In Scotland matters of P. are regulated by the officers of the Lyon Court (see LYON KING-AT-ARMS). In strict constitutional law the sovereign has, as complementary to the prerogative right to create new titles or dignities, the right to confer any P. he pleases (see *Coke's Institutes*, vol. iv.). But apparently he may not create a peerage with a right of P. inconsistent with the Act of

1540, which regulates the P. of all the nobility and great officers of state. He may, however, create baronets with P. before knights baronets, knights of the Bath, and knights bachelors, and grant both rank and P. before even the great officers of state and any peer of the realm to a foreign prince marrying into the royal family (see *Halsbury's Laws of England*).

The official table of P. will be found in such reference books as *Burke's Peerage* and *Dod's Peerage*. The sovereign is at the head, followed by the Prince of Wales and other sons, brothers, uncles, and nephews of the sovereign, and ambass. Then come the archbishop of Canterbury, lord high chancellor, archbishop of York, Prime Minister, lord president of the council, Speaker of the House of Commons, lord privy seal (if of baronial rank), lord great chamberlain, earl marshal, lord steward of the household, lord chamberlain, and master of the horse (these last five, if dukes). Next follow dukes, marquesses, earls, viscounts, bishops, secretaries of state (if barons), barons, certain officers of the household, secretaries of state not barons, knights of the Garter, privy councillors, chancellor of the exchequer, chancellor of the duchy of Lancaster, lord chief justice, master of the rolls, lords justices of appeal, lords of appeal, puisne judges, baronets, members of orders of knighthood, co. court judges, companions, members, and officers of various orders, gentlemen entitled to bear arms. Sons of peers, baronets, knights, etc., rank in a manner decided by that of the father, a duke's eldest son, for example, taking P. after a marquess, and the eldest son of a marquess after an earl.

In the U.S.A. the order of P. is as follows: Sovereign or president of a foreign state, the President, the vice-president (in the absence of the President), ambass., chief justice of the U.S.A., the vice-president (when President present), the Speaker of the House of Representatives in Congress, associate justices of the supreme court, the secretary of state, the secretary of the treasury, foreign ministers plenipotentiary, the secretary of war, the attorney-general, the postmaster-general, the secretary of the navy, the secretary of the interior, the secretary of agriculture, the secretary of commerce, the secretary of labour, senators, the House of representatives, the chief of staff of the army and the chief of naval operations, general of the army (five stars), fleet admiral (five stars), general (four stars), admiral (four stars), governors of states, etc. Rank is always official, i.e. Mr. Smith who is 'His Excellency the Ambassador' ranks above a prince or duke who is officially a secretary of embassy.

Precedents, in law, judicial decisions whether interlocutory (see INTERLOCUTORY PROCEEDINGS) or final, which serve, as a rule, for the determination of analogous or similar cases, are called P. P. have the force of law (*Bentham's Judge-made Law*), and no court will reverse a previous judgment of a court of equal, or co-ordinate, a *fortiori* of superior, authority. Thus the decisions of the House of

Lords are binding on all other courts, those of the court of appeal on that and all other courts below the House of Lords, and those of the various divs. of the high court on those divs. (see ROYAL COURTS OF JUSTICE) and all courts of inferior jurisdiction. The decisions of co. court judges and of the judges of the tribunals of the U.S.A. may be and often are cited in the Eng. courts, but are, as Prof. Salmond styles them, of *persuasive* but not *authoritative* efficacy (see also LAW REPORTS).

Precentor, dignitary in an Anglican cathedral, originally the leading singer in the choir, but also in charge of the vocal church music and superior to the organist. His seat is opposite that of the dean (who takes the *Decani* side) on the *Cantoris* side of the chancel. In some churches in Scotland, where the organ or other musical instrument is not employed, the P. is the leader of psalmody.

Preceptory, see TEMPLARS.

Precession. A westward movement of the equinoxes on the ecliptic so that they advance to meet the stars and the sun on its ann. return. Observations of the brighter stars over many years led Hipparchus about 125 B.C. to the conclusion that the latitudes of the stars were fixed but the longitudes increased. Although he did not know the reasons for this phenomenon, he was able to measure its effect with a fair degree of accuracy. The longitudes of the stars increase by 50".2 annually and as a consequence the sidereal year (the time required for the sun to move round the ecliptic) is greater than the tropical year (the interval between two successive passages of the sun through the first point of Aries). The difference between the two years is 20 min. 23 sec. Owing to P. the signs of the zodiac do not now agree with the constellations, and the first point of Aries is in the constellation of Pisces. The cause of P. is the pull of the sun and moon, the moon in particular, on the equatorial bulge of the earth. The tendency of the pull (actually a couple) is to make the equator coincide with the ecliptic, but the spinning of the earth prevents this and the phenomenon of P. takes place, a good illustration of which is seen in a spinning top when its axis is not vertical. Its head moves round comparatively slowly in a circle so that its axis describes a cone whose vertex is its point. The axis of the top can be taken to represent the earth's axis and the horizon the ecliptic, but as the tendency of gravitation is to pull the axis of the top towards the horizon while the attraction of the sun and moon tends to pull the earth's axis perpendicular to the plane of the ecliptic, the P. in the latter case is in a direction opposite to that in the former, assuming that the earth and the top spin in the same direction. The changes in the longitudes of the stars imply changes also in their right ascensions and declinations which are always used by astronomers in defining their positions. The poles of the equator perform a movement round the poles of the ecliptic in about 26,000 years, just as the axis of the top performs a

movement round a vertical line through its point, but the motion is not absolutely uniform nor do the poles of the equator move exactly in circles. This is due to certain fluctuations in the disturbing couples of the earth, and in consequence the earth's poles describe wavy curves, a phenomenon known as nutation (*q.v.*). This is often seen in a spinning top, the head 'noddling' to and from the vertical so that it describes a wavy curve. The pole star (*q.v.*), which is less than 1° at present from the point in the heavens to which the earth's axis is directed, was not always the pole star, nor will it be so in the future, P. causing different stars to occupy this position. See also VEGA.

Precious Stones, see GEM.

Precipitate Ointment, one of two ointments containing mercury compounds. Red precipitate is red oxide of mercury (HgO); while white precipitate is mercuric ammonium chloride (NH₄HgCl). Both are used locally for skin affections.

Precipitation. If one of the products of the chemical reaction between substances in solution is insoluble, that product is thrown out of solution, i.e. it is precipitated. The substance thrown out of solution is termed a precipitate and the action is termed P. The characteristic precipitate formed by substances affords methods of qualitative and quantitative analysis.

Predestination, divine provision and preparation of benefits by which those who are freed from sin and its consequences are most certainly saved. This is St. Augustine's definition (*De Dono Perscr.*, cap. 14). The doctrine of P. is explicitly contained in the Bible in such passages as Eph. i. 4-6, 11, and especially in Rom. viii. 29 f., and is accepted in some form or other by all the chief Christian churches. But the existence of human free-will is a fact of everyday experience and hence there has been a series of controversies throughout the hist. of the Christian Church, designed to reconcile this paradox. The difficulty is to reconcile the divine provision and the certainty of the prepared benefits with the freedom of the human will. Pelagius taught that man was justified on account of his foreseen merits, and against him Augustine attributed justification to a divine decree antecedent to man's merits. Following generally on the lines of Augustine Aquinas is found against Duns Scotus, the Jansenists against the Jesuits, the Calvinists against the Arminians, Whitefield against Wesley. For the hist. of patristic opinion see Potavius (*De Leo*, ix., x.). Of late stress has usually been laid more on the free-will of man than on God's P. See CALVINISM. See J. Forbes, *Predestination and Free-will*, 1878; J. B. Mozley, *Augustinian Doctrine of Predestination*, 1883; *Dictionary of Theological Catholicism*, XII (pp. 2809-3022), 1948.

Predicables, term in scholastic logic, used in connection with the scheme of classification borrowed from Porphyry. There are five P., viz. genus, species, difference (*differentia*), property (*proprium*),

and accident. The first two name the greater and lesser classes of things, a genus comprehending sev. species. The difference distinguishes various members of the same genus; the property is a distinction that is not ultimate; while the accident is any peculiarity not connected with the nature of the species. *See also* UNIVERSAL.

Predictor, device for discovering automatically the future position of a moving object. The prin. use is in the sighting of anti-aircraft guns. The target is held in the optical part of the P., consisting of a height finder and a range finder. The factors of height, speed, and drift are automatically calculated and the results interpreted in the training of the guns and the setting of fuses, the whole process being controlled by the P. operator.

Pre-emption, or Purveyance, anct. royal prerogative by virtue of which the king enjoyed the right to purchase provisions and necessaries for the royal household at a fair price, in preference to every competitor, and without the consent of the owner. Payment was generally made in exchequer tallies, the amount being deducted from the next taxes paid in by the delinquent vendors. Naturally a system liable to such abuses was the subject of frequent petitions and numerous statutes. The prerogative was not finally surrendered until 1660, when the king gave up his rights in consideration of a fixed composition. Parliament agreeing to settle on the crown the hereditary excise on all beer and ale sold in the kingdom, together with a proportionate sum for certain other liquors.

Pre-existence, doctrine that man's soul had an existence apart before it became united to the body. It is eastern in origin, and in the E. it is generally associated with the doctrine of the transmigration of souls. Thus it is held by the Buddhists, and formed part of the Pythagorean system. Plato also upheld it, unless we may regard his language on the subject as purely symbolical. Philo Judæus also taught the doctrine of the P. of the soul, and from him it was adopted by Origen. It was condemned at the Council of Constantinople, and two main views of the origin of the soul were then open to acceptance. The belief in P. is countenanced by such names as those of Kant, Schelling, the younger Fichte, Lessing, Schopenhauer, and Jean Reynaud. The idea has been poetically treated by Tennyson in his *Passion of the Past* and by Wordsworth in his *Intimations of Immortality*.

Prefect, in France, political functionary in some respects analogous to the sheriff in England, but vested with far greater powers. The P. possesses extensive powers of municipal regulation. This office, estab. in 1800, was modified under the constitution of 1916.

Preference and Preferential Trade, *see* TARIFF REFORM.

Preference Share, *see* under COMPANY AND COMPANY LAW, *Capital*.

Frontal Leucotomy, *see* under INSANITY, *Treatment*.

Pregl, Fritz (1869-1930), Austrian chemist, b. at Laibach. From 1913 he was prof. at Graz. He worked out the methods of microanalysis of organic matter, for which he received the Nobel prize for chem. in 1923.

Pregnancy, period of intra-uterine development of the fertilised ovum. The time varies with different species of animals, and in human beings the average duration is from 274 to 280 days. Amenorrhœa is one of the first symptoms to be observed in P. Irregular hæmorrhages frequently occur in pregnant women, but there is no well-authenticated instance of menstruation continuing during P. Great care must be taken by the physician to distinguish between the amenorrhœa of P. and that dependent on anæmia, some debilitating disease such as phthisis, or on some pelvic disorder. Morning sickness is a fairly common symptom. It usually appears in the second month, and rarely lasts more than three months. Frequency of micturition, accompanied by some pain and discomfort, may occur in the early part of P., but disappears in the third month, when the uterus rises into the abdomen. Quickening occurs between the sixteenth and eighteenth weeks. The use of the word quickening is due to an anct. theory that at that time the fœtus came to life. It is the first consciousness, on the part of the mother, of the foetal movements, and is accompanied at times by nausea and faintness. The later symptoms of P. are chiefly those of increased abdominal pressure—such as œdema of the feet, varicose veins, cramp, palpitations, and dyspnoea. The signs of P. are of two kinds, presumptive and positive. The positive signs are the foetal movements and the foetal heart. These cannot be obtained before the sixth month. The foetal heart can be heard by the unaided ear, or by means of a wooden stethoscope. The rate of the foetal heart varies with the sex, age, and size of the fœtus. The pulse of the abdominal aorta may be mistaken for the foetal heart-beat unless care is taken to make sure that the beat heard does not synchronise with the maternal pulse. Breast changes occur in the eighth week. At this stage they consist of a nodular hypertrophy of the gland with some tenderness. Occasionally a little clear serum may be expressed from the nipple. By the sixteenth week the presence of secretion can generally be made out, and the pigmentation is increased. Later on a secondary areola appears, and often also Montgomery's tubercles. The enlarged uterus is not palpable abdominally until the thirteenth week. From this time until the end of the eighth month it rises steadily higher at a rate of rather less than half an inch a week until the eighth month. During the last two or three weeks the presenting part descends into the pelvic brn. so that the uterus appears smaller. Hegar's sign is of great use in diagnosis during the second and third months of P. In the later months, ballottement—the uterine soufflé—and the fœtalic souffle are additional points, the

most useful being, of course, the foetal heart sounds and foetal movements already mentioned. It should be remembered that although P. is a physiological condition, in some ways it approaches a pathological one, so that the pregnant woman, for her own sake, and for the sake of her child, should pay special attention to her health. The chief essentials for her well being are a quiet life, generous diet, fresh air, and plenty of gentle exercise. Violent exercise, worry, and excitement should be avoided.

Prehistory is generally defined as the story of events and conditions before written or recorded hist. The scientific study of the wide range of remains and monuments of the prehistoric period is known as archaeology. It should be noted, however, that the boundary between P. and hist. is often difficult to determine. In Britain, for instance, the earliest cultures of the Palæolithic (the

Old Stone Age) are dated very approximately 550,000 years B.C., while the dividing line between P. and hist. is usually placed at the Claudian Conquest in A.D. 43. On a strict interpretation, the Maoris of New Zealand were still in the Stone Age when Capt. James Cook visited the is. just after the middle of the eighteenth century, and a further indication of the nature of the difficulties involved in fixing the boundary of P. is shown by the fact that the Minoan civilisation of Crete, which used a form of writing, is always considered as prehistoric. The study of P. can also throw light on early hist. which is not well documented. The invasion of the Belgæ into Britain in the Early Iron Age, for example, is quite well known from reliable literary sources, but the archaeologist, in his investigation of the remains of the field systems introduced by these peoples, has been able to demonstrate their new method of agriculture based on the

TABLE I

1 Years	2 Geological Period	3 Archæological Culture	4 Archæological Stage
0 ———	RECENT	See Table II	Mesolithic
50,000 ———	ICE AGE (Würm)	Magdalenian	Upper Palæolithic
100,000 — —		Gravettian	
		Mousterian	
150,000 — —	Interglacial	Ice Ages in Clactonian Chellean Acheulan	Middle Palæolithic
200,000 — —	ICE AGE (Riss)		
250,000 — —			
300,000 — —	Interglacial		Lower Palæolithic
400,000 — —			
	ICE AGE (Mindel)		
500,000 — —	Interglacial		
	ICE AGE (Gunz)		
600,000 — —	PLIOGENE		

All later archæological periods occupy such relatively short times that they cannot be shown separately on this scale. Table II continues the above on a scale one hundred times as great.

TABLE II.

<i>Years</i>	<i>Hither Asia</i>	<i>Egypt</i>	<i>Greece</i>	<i>North-western Europe</i>	<i>Climatic Phase</i>
A.D. 1000	Islamic	Islamic	Byzantine	Dark Ages	
500					
0	Parthian Seleucid	Roman Ptolemaic	Roman Hellenistic	Roman La Tène	Sub Atlantic
B.C. 500	Persian Neo-Babylonian	Persian	Classical	Hill-statt	
1000	Assyrian		Archaic Dark Age	Late	Sub-Boreal
1500	Hittite Kassite	New Kingdom	Mycenaean	Middle Early	
2000	Babylonian Dark Age Age of Ur III Akkadian	Middle Kingdom Dark Age	Middle		
2500		Old Kingdom	Early Minoan and Helladic	Neolithic	
3000	Early Dynastic Jemdet Nasi	Proto-dynastic			Atlantic
	Uruk	Predynastic	Neolithic		
4000	at Ubad				
	Halafian	Mesolithic		Mesolithic	
5000	† Neolithic Stalk I				
6000	† Natufian				Boreal
7000					

use of the heavy wheeled plough which man has not been interested in the remains of his predecessors, but in opened up the fertile clay lands of the riv. valleys. Britain sev. factors have had a profound influence on the study of P. and the

There has perhaps been no time when

development of archaeology. The Industrial Revolution, with its great extension of urb. life, was responsible for an era of discovery which has scarcely been surpassed; the followers of the Romantic movement, in Britain as on the Continent, looked upon the mouldering skull, the auct. potsherds, and the dolmens with an excited pleasure, to which they were able to add a neo-Celtic appreciation of the Druids and, on frequent occasion, an attempt at antiquarian exploration. The third factor, and the one of greatest significance, was the acceptance of Darwin's theory of evolution and its application to the study of human origins.

Side by side with these main influences were others, among which should be noted the pioneer topographical work of John Aubrey (1626-97), and other antiquarian topographers exemplified by Wm. Stukeley (1687-1765); the formation of co. archaeological societies in the early part of the nineteenth century; the pub. of a classification of Dan. antiquities (1844) in accordance with the succession of stone, bronze, and iron, first formulated by Lucretius; and more particularly the discoveries (1845) at Abbeville in the Somme valley of humanly worked flints, together with an elephant's tusk in a geological deposit of the Pleistocene Age, which until then had been regarded as of an incredibly remote age. In recent years there has been a phenomenal increase in the volume of data available to prehistorians. The field of study is consequently wider. While in Britain certain geographical areas (e.g. Wessex and Sussex) and certain cultural periods (e.g. the Early Iron Age) tend to be prominent by reason of the proclivities of noted and estab. workers, it should not be overlooked that in considering the greater field, the prehistorian's study is on a wide scale; no longer does the Palaeolithic mean W. Europe; for example, but E. Europe, Africa, and Asia in addition.

In his study of the remains of early man the prehistorian considers and interprets age, material, function, and social environment. The quest for food and dwelling, the conditions of commerce, trade, labour, and communications, the way of worship, the presence of peace or war, and finally the burial and disposal of the dead, all come within his view. Discovery is the first concern, and then interpretation, and the two processes meet in excavation, the examination of a site by modern scientific method. The very great advance in our knowledge of P. made in recent years is largely the result of improved excavation technique. No longer is brilliant excavation confined to Egypt and the Near E. The Viking ships at Oseberg and Ladby, the Neolithic vil. at Köln-Lindenthal, near Cologne, the palisade barrows of the Early Bronze Age in Holland, and Maiden Castle and the Sutton Hoo ship-burial, both in Britain, are evidence enough of a faultless technique in Europe.

The chronology of P. is both relative and absolute.

The framework provided by the three

successive technological ages of stone, bronze, and iron is a beginning of ordered arrangement; it is borne out in stratified deposits, that is, for example, in the successive undisturbed layers of human occupation in a cave or a dwelling-site, and stratigraphy thus determines that the oldest relics come from the lowest layer. The chronology furnished by stratigraphy is relative; it does not determine the duration of the various periods, and it does not, in general, prove that a period in one area is contemporary with that in another. A cross-bearing is sometimes possible upon the historic civilisations, and the early historic periods of Babylonia, Egypt, and Crete are so used, but the reservation that the beginning of the Dynastic period can only be dated to c. 3100 B.C. is enough to show the limits of the system. Typology, and the study of progressive evolution or degeneration, is applied by the prehistorian to pottery form and decoration, to weapons, and to trinkets, and by its use, with certain well-known reservations, a relative chronological sequence can be obtained. Outstanding examples of the use of typology are Abercromby's identification (in 1901) of the Beaker Folk of the Bronze Age and their continental home by a study of their characteristic sepulchral pottery, and Collingwood's systematic chronology (in 1930) of Rom. brooches.

Absolute chronology is provided by geology and by changes in climate which have taken place over a considerable part of the surface of the earth. Analyses of pollen from the peat bogs of Britain, Scandinavia, the Alps, and other parts of central Europe have reflected the hist. of forest and vegetation in the epoch known to geologists as Recent. There are three main phases known in one terminology as Pre-Boreal, Boreal, and Atlantic, and in others by a system of numbers. So accurate is the process of pollen analysis that the layers of peat-bogs can be divided into intervals of a century. In Britain it has been used with striking results in the Cambridge fens. In the Pleistocene epoch a time-scale is provided by the Glacial Periods, the Interglacial Periods between them, and by Pluvials, periods of heavy rain, which fell in some regions now dry, such as Rhodesia and Persia. The question is complicated, and recent studies of solar radiation, although most valuable, have not lessened the difficulties. Geochronology is not yet fully developed as a science, although the work of de Geer in Sweden as long ago as 1885 made possible the counting of the exact number of years occupied by the withdrawal of an ice-sheet. It remains to mention dendrochronology, the new science of determination of date by observation of the ann. growth-rings of trees. Its use to the prehistorian in dating the timber-work of buildings of all periods cannot be overestimated. The use of vivianite as dating material, once loudly proclaimed, is now abandoned.

The tables on pp. 632 and 633, after Childe and Zeuner in *Progress and Archaeology*, set out a chronology of P.: (1) The earlier

archaeological stages with their probable geological equivalents and estimated duration in years; and (2) later archaeological and historical periods.

See also **MEGALITH**; **STONE AGE**; **SURVEYING AND LEVELLING**, *Aerial Photography*.

See V. G. Childe, *New Light on the Most Ancient East*, 1934, *The Dawn of European Civilisation*, 1939, and *Progress and Archaeology*, 1944; C. Fox, *The Personality of Britain*, 1938; J. D. G. Clark, *Archaeology and Society*, 1939; C. F. C. Hawkes, *The Prehistoric Foundations of Europe*, 1940; and *Proceedings of the Prehistoric Society* (in progress). A most valuable pub. is M. C. Burkitt and V. G. Childe, 'Chronological Table of Prehistory' in *Antiquity*, June 1932.

Pre-Islamic Inscriptions, see **ORKHON INSCRIPTIONS**.

Prelate, in church law, name given to the higher dignitaries of the church, such as archbishops, bishops, abbots, and certain members of the papal court.

Prelude, in music, introductory piece played before a church service or a musical performance, or forming the first movement of a suite or other sectional work; also one paired with a fugue, to which it forms an introduction. From the nineteenth century onward it is sometimes a separate concert work, especially for piano (Chopin, etc.) or orchestra; and from Wagner onwards the orchestral introduction to an opera where it does not take the form of a detached overture and leads straight into the first act.

Premature Labour, see **ABORTION**.

Premier, see **PRIME MINISTER**.

Premium: 1. In insurance a periodical sum paid by the insured or assured in order to secure the payment to him or his representatives by the insurer or assurer of a sum by way of indemnity for loss or damage to goods, or a stated sum at death, according to the kind of policy (see also **INSURANCE**). 2. In stock or share dealing the excess in the value of any securities over the price of issue. 3. A bonus or sum given for the loan of money over and above the interest. 4. A P. bond is one carrying with it the chance of winning a money prize. Such a bond is in the nature of a lottery, the prizes being given to holders of certain numbers drawn.

Premonstratensians, order founded by St. Norbert about 1120, which receives its name from Prémontré in the diocese of Laon, France, where the first monastery was founded. Its rule was that of St. Augustine, and the discipline was very severe. The order spread rapidly throughout Europe, and for sev. centuries was a serious rival to the Cistercian order. At the time of the Reformation there were in England thirty-five houses of the order, of which two were nunneries, but there is now only one, at Storrington, Sussex. There is a large Premonstratensian abbey in Belgium.

Pre-Raphaelite Brotherhood, primarily a group of three painters, W. Holman Hunt, D. G. Rossetti, and J. E. Millais,

whose aims constituted a reaction against current art traditions and proclaimed the 'return to nature.' This reaction was in some ways akin to Fr. Impressionism (see **IMPRESSIONISM**); it revolted against the 'grand style' and the arrogant allegory of the Romantics, and discarded the technical device of working on a dark brown ground with a composition of 80 per cent shadow. To a certain extent, therefore, it was foreshadowed in the canvases of Constable, Turner, and Bonington. Hunt, Millais, and Rossetti identified themselves with the artistic ideals of simplicity and sincerity which they had found in the works of Raphael's precursors, and estab. the fellowship called the P.-R. B.; one of their chief ambitions being to restore decorative art. Shortly after its inception the P.-R. B. increased from three to eight members. Thomas Woolner, sculptor and poet, who later forsook practical art and became a collector and connoisseur, was the first addition. James Collinson and W. H. Deverell, two not outstanding painters, followed. The remaining two were men of letters, Wm. Rossetti, brother of the painter and a poet of ability, and F. G. Stephens. To them the P.-R. B. was much indebted for their critical defence in the columns of the *Athenæum* and *Spectator*. See P. Bates, *Pre-Raphaelite Painters*, 1897; D. G. Rossetti, *Pre-Raphaelite Letters and Diaries*, 1900; W. H. Hunt, *Pre-Raphaelism and the Pre-Raphaelite Brotherhood*, 1905; and W. Gaunt, *The Pre-Raphaelite Tragedy*, 1942.

Prerogative Court. The P. C. of the archbishop of Canterbury was an old eccles. court which, prior to 1857, had gradually acquired practically all the contentious business in testamentary causes, previously falling within the jurisdiction of the local eccles. courts. In 1857 its jurisdiction was transferred to the Probate Court (*q.v.*).

Prerogative Royal, see **CROWN**.

Prerogative Writs, processes issued, not as of mere course, but in pursuance of the Crown's extraordinary powers of rendering assistance to the subject on proper cause shown. These writs are: certiorari (*q.v.*), habeas corpus (*q.v.*), mandamus (*q.v.*), procedendo (which issues when the judge of an inferior court (*q.v.*) neglects to give judgment; a concurrent and more usual remedy is the mandamus), prohibition (*q.v.*), and quo warranto (*q.v.*). Proceedings for the issue of P. W. are begun by motion in a divisional court.

Presbyonia, see under **OPHTHALMOLOGY**.

Presbyterianism, form of church government, in which the leading part is taken by presbyters or elders. It stands, therefore, somewhat midway between the two systems of Episcopacy and Congregationalism. In the former, authority rests with the bishop in the latter with the individual congregations. In P. authority rests with a succession of councils, each consisting of ministers and elders. Presbyterians themselves claim that P. is identical with or akin to the order of apostolic times. The present system owes its estab.

to the Fr. reformer Calvin. This took place at Geneva, and the system spread widely, though in somewhat modified forms. It is important to notice that P. primarily denotes a form of church government, so that under this title come many bodies differing in their confessions of faith. Generally speaking all the Presbyterian bodies are Calvinistic. The Presbyterian Church has but one spiritual order, that of Presbyters, though the Presbyters are divided into ministers and elders. The minister occupies the chief position in each congregation, dispenses the sacraments, and conducts the services of the church. There are sev. elders to each church, and though ordained by the Presbyters, they are actually laymen. They assist the minister in matters of discipline, and they may be described as the 'ruling elders,' while the ministers may be described as the 'teaching elders.' The deacons are not concerned with spiritual matters, but have charge of the money for the poor, and in some cases have the general financial control of the church. The Presbyterian constitution is as follows: Each church or par. is under the care of the Kirk Session, which consists of the minister and elders of the particular church. This is the lowest of a series of courts of judicature, and controls the discipline of the congregation which it represents. The minister is the moderator *ex officio*, and without the presence of the minister or a deputy appointed by him no meeting can be held. The Kirk Session has no control over the minister, who is responsible to the Presbytery alone; hence his independence is assured. Above the Kirk Session is the Presbytery, which consists of all the ministers in a given dist., and one elder from each par. The moderator is elected from among the ministers. This court is held at regularly fixed intervals, but may be called at other times. It has the supervision of the entire dist. from which its members are drawn, and forms a court of appeal from the Kirk Session. The Synod, which normally meets twice a year, represents a number of Presbyteries in the same way as the Presbytery represents a number of congregations. Above it, and forming the final court of appeal, comes the General Assembly, which meets annually, and represents the whole church by means of ministers and elders sent from each Presbytery. It supervises all the work of the church, conducts missionary enterprises, and generally superintends the interests of the whole body. A moderator is chosen at each Assembly, and each year the place and time for the next Assembly are agreed upon. There is a difference of opinion among Presbyterians on the question of church estab. The dominant personality of many of the early leaders often tended towards a theocracy. The majority of modern Presbyterians, however, favour a cessation of the union between the state and the church. The spiritual independence of the church has been a fundamental tenet of P. from the beginning. In Scotland, since the union of 1729, it is now acknowledged by the

State. The doctrines of P. are Calvinistic and evangelical, and the large number of doctrinal confessions which the various churches have produced show almost entire agreement. The Eng. and Scottish churches accept the Westminster Confession, and the Larger and Shorter Catechisms. The N. church has also the Scottish Confession of 1580. Other confessions are the First Helvetic, Geneva, Gallican, Frisian, Belgian, Dutch, Hungarian, and Bohemian. The worship proceeds, broadly speaking, on the lines of the *Directory of Public Worship*. Most churches have now official books of order for the guidance of ministers; there are, however, no compulsory forms. The chief countries in which P. has taken a firm root are Scotland, Switzerland, England, France, Ireland, the Netherlands, and the U.S.A. (For Scotland, see SCOTLAND, CHURCH OF.) The Swiss and Fr. churches were formed exactly on the model of Calvin. The Presbyterian Church in England traces its origin to the Puritan nonconformists. During the eighteenth century these declined rapidly in numbers, and many of them became Unitarians. A revival came in the last century, largely through Scottish influence, and the association between the Eng. Presbyterians and the Church of Scotland became very close. Ireland has also very closely followed the Scottish model. In modern P. the ecumenical spirit is increasingly strong; it has made possible in the United Church of S. India a combination of episcopacy with Presbyterian essentials. P. in the U.S.A. may be said to have begun about 1610, the first Presbytery being that of Philadelphia in 1704. It now forms a most flourishing body, and in 1949 its total number was given as 3,349,073 in all the various branches, including the Negro churches. See T. M. Lindsay, *History of the Reformation*, 1907-8; J. Moffat, *The Presbyterian Churches*, 1928; C. L. Warr, *The Presbyterian Tradition*, 1939; and J. L. Ainslie, *The Doctrine of Ministerial Order in the Reformed Churches of the 16th and 17th Centuries*, 1940.

Presbytery, in eccles. architecture the sanctuary, or that part of the choir of the church in which the high altar is placed. The name is sometimes extended to the whole choir. Also house of R.C. priest.

Prescott: 1. Par. and former mkt. tn. of Lancashire, England, 3½ m. W.S.W. of St. Helens; it has manufs. of electric cables, plastic, and sheet-metal plating. There are printing works and coal-mines. Pop. 11,300. 2. Or **Prescott**, tn. and port of entry, Ontario, Canada, on the St. Lawrence R., 49 m. S.E. of Ottawa. There are marine works. Pop. 3200.

Prescott, William Hickling (1796-1859), Amer. historian, b. at Salem, Massachusetts, educated at Harvard Univ. In early life he lost the use of one eye and the other became almost useless, but with the aid of readers and secretaries he prepared his book of *The History of Ferdinand and Isabella* during 1827-38. This was followed by *The Conquest of Mexico* (1843); *The Conquest of Peru* (1847); and *History of Philip II.* (3 vols., 1859; unfinished),

His works, though charged with historical inaccuracies, have become recognised as Eng. classics

Prescott, (city and seat of Yavapai co., Arizona, U.S.A. It has gold, silver, and copper mining. Pop. 3200

Prescription, in law, broadly speaking, is that right given partly by common law (*qv*) and partly by the Prescription Act of 1832, by which a person claims to be entitled as *owner*, to easements or profit *a prendre* over or from the lands of another (see INCORPORIAL HEREDITAMENTS and LAND LAWS) on the sole ground of long *uses*. By the common law a man who could not show an express grant (see GRANT) might successfully show either (1) that he and his ancestors had from time immemorial (the time of legal memory is the accession of Richard I.) had undisputed enjoyment either of a right *in gross* (i.e. not dependent on any estate in land held by him or his predecessors), or (2) that he and his predecessors in title as owners of certain lands had from time immemorial had some easement over or profit *a prendre* (*qv* and see COMMON, RIGHT OF) from certain other lands. Later this excessive rigour of proof was mitigated by allowing evidence of uninterrupted user for upwards of twenty years to stand as conclusive proof of immemorial user unless rebutted by proof that the enjoyment had in fact begun within the time of legal memory. This remains the law of P. as to (1) but as to (2) the owner of the *dominant* tenement may prove his title to a right over the other or *servient* tenement either as above or under the Prescription Act, which Act has greatly shortened the requisite periods of uninterrupted enjoyment. Under this Act thirty years give a *prima facie* right, sixty years an indefeasible right to a profit *a prendre* (subject in the latter case to the effect of some agreement incompatible with the claim); twenty and forty years are the respective periods for easements (*qv*), and an indefeasible right to light is conferred after twenty years (see LIGHT, ANCIENT). The periods are calculated backwards from the date of any action brought against the prescribing owner, and no act is to be deemed an interruption unless acquiesced in for one year after the party interrupted shall have had notice of it.

Presentation, formal act by which the patron of a vacant living presents to the bishop for institution the clerk whom he has chosen to fill the same. It is regulated to some extent by the Benefices Act of 1898. When the appointment to a benefice lies in the hands of the bishop himself, he is said to 'collate' and not to present to it.

Presentation at Court, see COURT PRESENTATION AT

Preserved Foods Food preservation aims at retaining the colour, flavour, aroma, and texture of fresh produce for an indefinite period so that it may be consumed outside its natural growing season and in parts of the world where the fresh produce is not available. The causes of deterioration in fresh produce are chemical and biological changes which

proceed sometimes quite slowly, sometimes with great rapidity. The biological changes are in general more pronounced than chemical changes and are the result of infection and growth of micro-organisms, i.e. bacteria and moulds. The means by which growth and development of these micro-organisms is arrested or prevented constitutes the science and practice of food preservation. In drying or dehydration the water which is essential for growth of bacteria and moulds is removed. The process is accompanied by a considerable reduction in bulk. Salting and pickling are adopted as a means of curing or preserving both animal and vegetable products and rely on the retarding effect of salt and acid on the growth of harmful micro-organisms. A further commonly employed method of preservation involves the addition of chemical preservatives such as borates, benzoates, and sulphur dioxide commonly used, for example, in sausages and fruit drinks. The use of chemicals harmful to the consumer is closely regulated by the Food and Drugs Act. A high concentration of sugar acts as a deterrent to bacterial and mould growth, and is an important aid to the keeping properties of jam and confectionery. Canning relies on the destruction by heat of micro-organisms which would otherwise cause spoilage. Most frequently but not exclusively, it involves sealing the material to be preserved in a glass or metal container prior to the application of heat. Almost any type of perishable food may be preserved by this means.

François Appert, in the early part of the nineteenth century was the first to apply the preserving process by sterilisation, that is, by placing the food in bottles or cans and after hermetically sealing the containers, subjecting them to heat for a specified time. Much progress, however, has been made since those days both as regards the containers used and the scientific control of the canning process. For example the tops and bottoms of most cans used nowadays are hermetically sealed without the use of solder.

As canned foods are cooked when sealed in the tin they retain a large proportion of the vitamin and other nutritive constituents of the corresponding uncooked foods and for this reason are extensively used on ships and for voyages of exploration where fresh produce is not available. To obtain the full nutritive value from canned fruits and vegetables, both the solid and liquid portions of the contents of the can should be used.

Freezing with which may be included chilling, has made rapid strides in recent years as a means of food preservation. Refrigerated ships now transport food in bulk all over the world while quick frozen foods in small packages provide a convenient means of internal distribution of food which by this method more nearly retains its original characteristics than by any other means of preservation.

Condensed milk is either whole or skimmed milk evaporated to about one third of its bulk. There are two varieties

sweetened and unsweetened. It is preserved in cans, which after hermetical sealing are submitted to a high temp. to ensure sterilisation. Under the Food and Drugs Act, condensed milk, other than that labelled 'skimmed' milk, must conform to certain regulations as to minimum milk fat content. Powdered milk, which has become popular in recent years, is made either from entire milk or skimmed milk. It is often used for sick people unable to take fresh milk, and is largely used also in making certain manufactured foods.

Preserving. If not carefully treated many fruits will decompose rapidly when attacked by bacteria, moulds, or yeasts, and the problem of their preservation is how to protect them from these. Winter pears and apples, however, may be stored to bring them to perfection. A fruit-room should be cool and shady, but at the same time dry and airy, and sunshine should be avoided. The fruit should be gathered before it is ripe, handled carefully, and laid out separately on slatted trays or wrapped in paper to prevent contact with other fruit. Periodically the fruit should be examined, and any showing signs of decay removed.

The three prin. methods of P. fruit and vegetables are (1) dehydration or drying, i.e. the evaporation of almost all water, this being one of the earliest known methods; (2) sterilisation, or the killing by heat, low temps., or freezing of harmful germs or bacteria; and (3) the addition of chemical agents such as sugar, salt, vinegar, or sulphur.

DEHYDRATION OR DRYING.—This is achieved either naturally or artificially, i.e. in the open air by the sun and wind, or in ovens or hot cupboards. In Australia, California, and parts of France, the Near and Middle E., and other dry and warm countries, apricots, currants, dates, figs, peaches, pears, raisins, sultanas, etc., can be dried naturally; but the moist climate of the Brit. Isles is usually unsuited for this method, and the oven, hot cupboard, or warm room is substituted. As in all methods of P. fruit and vegetables should be freshly gathered, quite sound and ripe, but not over-ripe, and washed free from dust and grit. Apples should be peeled and cored, and cut into rings. Soaking in cold salted water (one teaspoonful to a pint) will preserve the colour and prevent browning. Pears may be treated in a similar way, but sliced lengthwise after being cored; plums and apricots should be stoned and halved. Apple rings may be threaded on sticks, and other fruit laid on muslin-covered trays. Oven temp. should be from 120° F. to 150° F., with the door left slightly open. Heat should be gradual, i.e. low at first to prevent outside hardening, bursting, or swelling of the fruit. The drying may be done intermittently over two or three days, or, if continuous, about 6 hrs. should be sufficient. The fruit or vegetables (protected from dust) should be left in a warm room to finish off the drying, and then tested by pressing sev. pieces together in the hand. These should feel pliable and springy, but

not brittle, and no moisture should be seen. Before using dried fruit it should be soaked in water for 24 to 48 hrs., and boiled slowly until quite tender, when sugar may be added. Vegetables, such as broad beans, string beans, mushrooms, marrow, etc., may be dried in the oven, but root vegetables, such as carrots, turnips, swedes, etc., are better stored in clamps or sand. Herbs, such as parsley, mint, sage, and thyme, should be gathered before flowering, and when quite dry. These need only 1 hr. in the oven at about 120° F.; or they may be hung in muslin bags in a warm room, or placed above a stove for 3 to 4 hrs. Parsley may be dried in a hot oven for a few minutes only, which will preserve the colour. The dried leaves should be crisp, and may then be crushed and stored in air-tight tins, or if put into bottles they should be stored away from strong light.

STERILISATION.—P. by heat may be done in jars or bottles, or by the home-canning method. The art of bottling fruit has long been practised, and is still a popular and inexpensive method. Simple apparatus, such as ordinary jam jars with special or home-made air-tight caps or lids, may be used quite successfully, but special bottling jars, complete with glass cap and metal screw bands, can be bought. All utensils, jars, bottles, caps, etc., should be scrupulously clean and free from defects. Fruit should be fresh, clean, and ripe, except gooseberries, which should be green and under-ripe; over-ripe or unsound fruit should be discarded. The two familiar methods of bottling are by the water method and the oven method. For the first it is recommended that a special steriliser be used, i.e. a pan with a false bottom and a lid with a hole in which the thermometer is placed. An ordinary deep pan or fish kettle may be used, but it is essential to have an extra bottom to place inside the pan; this may be a double piece of cardboard, a folded cloth, or newspaper. It is important to have a bottling thermometer to obtain the correct temp., for sterilising yet P. valuable vitamins, and also to keep the flavour and colour of the fruit. The water method is better than the oven method, because it is easier to control the temp. For the water method the fruit is packed into bottles, and cold water or cold syrup (made from $\frac{1}{2}$ lb. to 1 lb. of sugar, or golden syrup, boiled in 1 pint of water; peaches require the maximum amount of sugar) should be poured over the fruit to the neck of the bottles; and rubber rings and clip lids or glass tops with screw bands are then fitted on the containers. Other air-tight seals may be obtained by using paraffin wax, mutton fat, porsean skin, or layers of grease paper dipped in white of egg or milk. After being screwed down bands should be undone slightly (a half turn is sufficient) to allow air to escape during heating. The filled and capped bottles are put into the steriliser, which is then filled with cold water up to the top of the bottles; the steriliser or pan is then put over a low heat, allowing the temp. to rise gradually (about $1\frac{1}{2}$ hrs.), to 165–175° F.

The recommended temp. should be held for 10 to 30 min., according to the requirement of the contents. The hands should be adjusted securely on the removal of the bottles from the steriliser.

In the oven or dry method bottles are packed with fruit, without any liquid, capped loosely, and put into a low oven (about 240-250° F.) for 40 to 60 min. While the jars are in the oven, boiling water or syrup should be made ready; jars or bottles should be removed from oven, singly, filled quickly with the boiling liquid, and sealed instantly. When the bottles are quite cool (allowance of at least 12 hrs.) they should be tested by removing the screw bands or spring clips, and lifting the bottles by their lids, so proving the vacuum. If any lids are loose the fault must, if possible, be detected and sterilisation repeated. Any fruit, whole, sliced, or pulped, may be bottled. Good results are obtained in the P. of apples, apricots, black-currents, cherries, damsons, gooseberries, peaches (skins should be removed by plunging the fruit in boiling water for 1 min., and then into cold water), pears (preferably ripe, but if unripe they must first be stewed before packing into bottles), plums, and rhubarb young. Tomatoes should be firm and just under-ripe, and skinned like peaches; packed whole, quartered; or pulped (see below, *Pulping*). The water method is recommended for tomatoes, as a temp. of only 190° F., raised in 1½ hrs., is needed, and held for 20 to 30 min. Tomatoes should not be brought into contact with any copper utensils.

Acid fruit is easier to sterilise than vegetables, and for various reasons the P. of the latter at home is not recommended. It can be done, however, but special experience and equipment are necessary. Vegetables contain heat-resistant bacteria and lack the acid necessary to kill bacteria. The high temp. needed to sterilise vegetables requires a pressure cooker (see *PRESSURE COOKERY*), which is a necessary part of the equipment, and great care is needed in carrying out the process. The addition of small quantities of an acid, such as vinegar or lemon juice, to a non-acid vegetable or meat does not change the acidity of the food enough to permit processing in the boiling water bath. This can be done only if enough acid is added to pickle the food (see *Bulletin No. 1782, Home Canning of Fruits, Vegetables, and Meats*, issued by the U.S. Dept. of Agriculture).

Pulping is another way of storing fruit and tomatoes. Preparation is the same as for bottling, but cooking is first done in a saucepan with a little water (sugar may be added to the fruit and salt to the tomatoes). The boiling pulp is poured into previously heated bottles and sealed immediately, but to ensure complete sterilisation the bottles must be put into a steriliser or pan of hot water, and held at boiling point for a few minutes.

Home Canning needs special equipment, i.e. a seaming machine, steriliser, and cans. Fruit or vegetables should be prepared as for bottling, and packed into cans within

one-eighth of an in. from top. In the case of fruits the covering liquid should be boiling syrup, and for vegetables, boiling salted water. The loose lid is placed on the can, sealed immediately, and then placed in a pan of boiling water. The water must be reboiled quickly, and held at boiling-point for 10 to 45 min., according to the contents of the tins. The cans should be quickly cooled to blood heat by standing them in running cold water. As previously stated, vegetables need higher temps. to sterilise than fruits, and a pressure cooker should be used. Meat, game, poultry, and fish can be canned, but they present special problems which must be carefully considered.

CHEMICAL AGENTS.—Sugar is used in large quantities in the making of jam (*q.v.*), and also for crystallising fruit. Salt when used in sufficient amount preserves food, yet does not affect its nutritional value. Runner beans, sliced, or Fr. beans whole, may be successfully preserved, if packed in jars with the addition of alternate layers of salt (1 lb. to 3 lb. beans). The packed jars should be closely covered; and when the beans are required for use they should be well washed to remove the salt before cooking. Vinegar is used as a preservative in the making of chutneys, pickles, sauces, etc. Sulphur has been used for many years to preserve fruit, and can now be obtained in the form of fruit P. tablets. This method is useful for P. temporarily large quantities of fruit. The tablets should be dissolved in cold or slightly warmed water, which is poured into jars packed with prepared raw fruit, and then made air-tight. Red fruit becomes discoloured in the solution, but regains some of its original colour when boiled. The sulphur method may be used for blackberries, black-currents, cherries (sweet), gooseberries, pears, tomatoes, or vegetables. Before using fruit preserved in this way it is important that the sulphur dioxide should be driven off by boiling the fruit in an open pan for at least 10 min. Sugar may be added afterwards, when the fruit will be ready for use in pies or puddings, or may be made into jam.

FRUIT SYRUPS.—The fruit should be fully ripe and freed from grit by washing through a colander; large fruit should be pulled to pieces. It should be placed in an aluminium or thick enamel saucepan, with a little water if necessary. A wooden spoon is used to crush the fruit against the sides of the pan, which is heated until the juice has been extracted over moderate heat; this may take from 10 to 20 min. The pulp is then strained through a fine sieve, and finally through a jelly bag. Sugar, from ½ lb. to ¾ lb. per pint, is added after the straining. A final clearing through one layer of butter muslin is necessary to get rid of any solids left by the sugar. The syrup should be bottled as soon as possible, all corks being boiled for 1½ min. before use. A space of at least 2 in. must be left between the top of the syrup and the cork, which is then tied with string or wire. It is necessary to be

assured that the corks are quite airtight.

Eggs.—These may be preserved in several ways, but should be new-laid if possible, less than seven days old, and clean and free from cracks. They may be smeared with lard or oil, and buried separately in bran, and the process repeated after every six or eight weeks. In the water-glass or silicate of soda method the eggs are immersed in a liquid solution in stone pots, pitchers, or jars. As the eggs must be completely covered by the liquid any evaporation should be made up periodically. A further method is dipping the eggs into a proprietary sealing liquid and storing them dry (preferably with separating divs.) in baskets or boxes; the eggs preserved in this way will keep up to twelve months. Eggs, hard-boiled and shelled, may be pickled in vinegar.

Commercial P. of food is described in the article **PRESERVED FOODS**.

See also **WINES, HOME-MADE**.

See C. GRANGE, *Bottling and Preserving*, 1931; Mrs. Arthur Webb, *Preserving*, 1947; and Ministry of Agriculture and Fisheries, *Domestic Preservation of Fruit and Vegetables* (Bulletin 21), and Good Housekeeping publs.

President, one who 'presides' over or directs. In classical Lat., *præses* was the title of governor of provs., and in England, in the seventeenth century, P. was used for the king's 'lieutenant,' who had extensive powers delegated to him. In the final constitution of the U.S.A. the head of the Federal Gov. was called P. This is the most common meaning of the word, the head by election of a modern republic, such as the U.S.A., France, S. Amer. states, Switzerland, etc. The P. of the U.S.A. has more power than any similar official elsewhere. The Amer. P. is commander-in-chief of the U.S. Army, Navy, and Air Force. The title is given to the heads (or sometimes in Great Britain to the second in importance) of colleges and univs., to the person presiding over the meetings of learned societies and conferences, and in Great Britain to some ministers of the Crown and judges.

President of the Council, Lord, in Great Britain one of the great officers of state, who presides over meetings of the privy council, but has few other duties. Since 1880 the office has been a political one, held by a member of the party in power, who is usually a leading member of the Cabinet free to undertake duties of a general nature.

Prešov, tn. in Slovakia, Czechoslovakia, N. of Kaschau. It is important for machine and chemical works. Pop. 27,800.

Press Association, The, founded 1868, largest Brit. home news agency and also a part-owner, with London and Commonwealth newspapers, of Reuters, the leading Brit. world news agency. The P. A. is owned by the prin. newspapers of the United Kingdom (outside London) and Eire. It provides London and prov. newspapers, by means chiefly of its own private telegraph system over wires leased from the post office, with a complete

service of home news, including general, parl., courts, and all branches of sport, and newspapers outside London with the overseas news services of Reuters. The P. A. special reporting service supplies special reports of events of local interest to daily, weekly, and trade newspapers, and also to periodicals. In addition the P. A. serves London and prov. newspapers with a daily photograph service, including photographs by wire to prov. newspapers when required. In conjunction with the Exchange Telegraph Company the P. A. supplies over its private telegraph system or by telephone or tape machine services, reports of cases heard at the royal courts of justice, stock exchange and commercial news, racing results and betting, and football and cricket scores. The head office is at 85 Fleet Street, London, E.C.4.

Press Club, London, leading P. C. of the Brit. Empire. It was founded in 1882 with George Augustus Sala as its first president, its membership in 1950 numbered 1600, comprising tn., country, overseas, associate, life, and honorary members. President, Col. J. J. Astor of *The Times*; manager-secretary, Mr. A. Lazenby. Membership is strictly journalistic.

The club was estab. by parl. journalists in the days when the House of Commons often sat far into the night, and transport to suburban dormitories was inadequate to bridge the gap between the last night and early morning trains. It changed from one home to another, making its last move from Wine Office Court to Salisbury Square in 1914. Since then its activities have greatly expanded. On the social side they include a widely varied series of functions, outstanding among which is the ann. Derby lunch founded by Edgar Wallace when chairman of the club (1923-24). It has a well-stocked reference library, with a strong section on the hist., technique, and personalities of journalism, and notable collections of the Brit. press from its foundations in the early seventeenth century to the wartime press of 1939-45, with a Book of Honour in memory of the journalists and press photographers throughout the empire who lost their lives in the two world wars. Address: 7 St. Bride's House, Salisbury Square, Fleet Street, E.C.4.

Press-forging, see under **METALLURGY** (**FABRICATION OF METALS**).

Press, Freedom of the. In the language of constitutional law, this phrase implies hardly more than that the P., no less than the individual, enjoys full liberty of discussion, subject only to the ordinary law of libel. Strictly the trend of modern legislation is to exempt journalists from the maximum of liability incurred by other persons, provided that what was inserted in the P. was inserted without spite and in good faith. This higher measure of liberty is a direct reversal of the state of things during the heyday of the Star Chamber when public opinion, the only true champion of popular liberties, was incapable of expressing itself in its most effective manner, through

the medium of the P. Among historians it is almost an axiom that the F. of the P., far from being estab. by any formal pronouncement, was the indirect and accidental result of the refusal of the Commons, in 1695, to re-enact the Licensing Act of 1662 (see CENSORSHIP OF THE DRAMA; NEWSPAPERS). This result is no doubt eminently in harmony with the practical, if unscientific, methods of the Brit. law-giver; but it is inconceivable that the Commons, with the memory of *Histriomastix* in their minds, and the lines of the *Areopagitica* before their eyes, were not perfectly well aware of the probable consequences of their action. See also JOURNALISM.

Pressburg, or Presburg, see BRATISLAVA.

Pressgang, name given to the detachment of officers and men commissioned to execute warrants for the impressment of men to serve in the Brit. Navy. They generally consisted of a captain, two lieutenants, and a body of picked men. A rendezvous was chosen, and volunteers were enlisted, deserters arrested, whilst all able-bodied men were liable to be pressed. By an Act of 1835 the period of compulsory service for men impressed for the navy was limited to five years. The employment of the P., though in abeyance, is still legal.

Pressure and Pressure Gauges, see HYDROSTATICS; GAS AND GASES.

Pressure, Centre of, see CENTRE.

Pressure Cookery. Pressure cooking is a method used for accelerating the process of cooking with water, by means of apparatus or utensils which produce pressures greater than atmospheric. By this means, cooking is carried out at temps. greater than the ordinary boiling point of water. At normal atmospheric pressure at sea level, water boils at 212° F., whereas if the pressure is doubled (i.e. increased by about 15 lb. per sq. inch) it will boil at 250° F. It is this higher temp. which accelerates the cooking process, so that, for example, a stew will require about 25 min. in a pressure cooker at 15 lb. per sq. inch compared with four or five times as long in an ordinary saucepan. Because of the shorter time involved, fuel consumption is reduced.

The forerunner of the modern simple pressure saucepan, as well as of the larger digesters still in use for processing meat bones, was the digester invented by the Frenchman Papin in 1679. The principle still most commonly used is the same, whereby the pressure of steam generated in the cooker is regulated by a valve which allows the steam to escape when it has reached the predetermined pressure. Most pressure cookers have, in addition to the release valve, a further safety device which releases the pressure if, for some reason, the release valve does not function.

The pressure attained in most models is 15 lb. per sq. inch, but some of the newer models have devices, usually a series of weights on the valve, by which more than one pressure can be used. The common values of pressures used, and their equivalent temps. are: 5 lb. (228°),

10 lb. (240°), 15 lb. (250°), 20 lb. (259°), 30 lb. (277°). These different pressures make it possible to choose those which give temps. most suitable for different types of food, so that frozen foods can be cooked at lower temps., vegetables at intermediate temps., and meat and soups at higher temps.

The pressures mentioned will only give the appropriate temps. if the atmospheric pressure is that normally found at sea level. At high altitudes, the atmospheric pressure is appreciably lower so that water boils ordinarily at a lower temp. For example, at 8000 ft., water boils at about 200° F. Ordinary cooking is therefore appreciably slower at these altitudes than at sea level. With a pressure cooker, however, higher temps. can be achieved and the effect of high altitude overcome.

It has been suggested that the nutritive value of foods would be adversely affected by the higher temps. attained in pressure cooking. As against this, however, the shorter time of the cooking process, the fact that the air in the cooker is displaced by steam, and the smaller quantity of water used, might be expected to decrease the loss of nutrients, such as vitamins which are easily oxidised in air, or vitamins and mineral salts which dissolve in the cooking water. Recently these theoretical views have been tested by experiments in which the effects on the nutrients of various foods have been determined when they are cooked by a pressure cooker or by other means. The results show that the effects of pressure cooking on food generally are either very much the same as, or slightly better than, those found with other good methods of cooking when these are used in ways which are most calculated to conserve nutrients. These experiments have been relatively few and concerned only with some of the nutrients; more work will have to be done before the complete effects of pressure cooking on all the nutrients are known. Experiments made on guinea-pigs by the Swiss Board of Health in Berne have shown that food which is overcooked in a high-pressure steamer loses its value. The *British Medical Journal* of April 2, 1949, observes that 'So far as can be judged from the limited evidence available, pressure cooking does not cause any greater loss of vitamins than good ordinary cooking. . . . Total immersion of the vegetables in an open saucepan invariably caused much greater losses. . . . But if misuse of the pressure cooker gradually accustoms the taste to very soft potatoes, and brown pulpy vegetables, then the risk of malnutrition is a real one.'

Since pressure cooking is so much quicker than ordinary cooking, it is necessary to time the process more carefully, especially with foods like vegetables which only take a few min. Too long cooking, even for a minute or two, will destroy the attractiveness and palatability of such foods and cause loss of nutrients. However, the directions supplied with most cookers, together with a little experience of their use, will enable the user to judge the necessary times of

cooking with reasonable accuracy. See C. K. Sutherland, F. G. Halliday, and W. F. Hinman, *Food Research*, 1947; Good Housekeeping Institute, *Pressure Cookery*, 1949; and Gweneth M. Chappell and Audrey M. Hamilton, 'Effect of Pressure Cooking on Vitamin C Content in Vegetables,' *British Medical Journal*, April 2, 1949.

Prestatyn, urb. dist. of Flintshire, Wales, on the coast, 205 m. from London. It is a holiday resort with a fine background of mt. scenery. Pop. 8700.

Prestelgne, co. tn. of Radnorshire, Wales, an urb. dist. and mrkt. tn., on the R. Lugg, 157 m. from London on the W. Region railway. The riv. attracts many visitors for trout and grayling fishing. There is a shirehall where assizes and quarter sessions are held. Pop. 1200.

Prester John, probably mythical character, supposed in the Middle Ages to rule over a vast domain in the interior of Asia. Efforts were made by the popes to communicate with him. According to popular belief he was a Christian priest as well as king. The report may have originated with the Nestorian missionaries of Mesopotamia, who penetrated into Persia, India, and Tartary. Some have identified P. J. with the Grand Lama of Tibet, others with Toghruil Wang-Khan, chief of the Keraites, and still others with the Abyssinian king of Habbesh, or the founder of the empire of the Khara-Khital. A kinsman who took the same name is said to have been slain by Jenghiz Khan. The Portuguese quest for P. J. began in 1415 after the conquest of Ceuta. But the European legend of a P. J., fabulously rich and powerful, had vanished when the Portuguese, with great loss of life, saved Abyssinia from Moslem domination. See F. K. T. Zarucke, *Der Priester Johannes*, 1876-79; Sir H. Yule, *Cathay and the Way Thither*, 1866; and E. Saecan, *Portugal in Quest of Prester John*, 1943.

Preston, co. and municipal bor. and seaport in Lancashire, England, on the Ribble, 21 m. S.S.E. of Lancaster, with which it is connected by canal. It is the administrative centre for the co. Buildings include the Harris public building, museum, and institute, founded in 1882, the modern municipal building, the tn. hall and guild hall, seriously damaged by fire in 1947, and the public hall. P. Grammar School was founded in the fourteenth century, and there are sev. other schools, and a technical college. P. has a number of hospitals and sev. public parks, including Avenham, Miller, Ribbleson, Haslam, and Ashton. The churches in P., sev. of which are Rom. Catholic, are all modern. The prin. Rom. Catholic church, dedicated to St. Wilfrid, dates from 1793, but in 1879 it was almost entirely rebuilt. The steeple was designed by Hansom, who invented the hansom cab.

The name P. may be a corruption of *Prestat-tūn* (Priest's Town), so called because of the number of religious houses once there. A large number of the citizens are Rom. Catholics. P. is referred to

in Domesday Book. Henry II. granted it a royal charter in 1179: this was followed by others granting various privileges including the right to have a fair. This fair still exists, but is no longer associated with trade or burgess rights; known as the P. Guild, it takes place every twenty years, first being recorded in 1328. There was fighting in and around the tn. during the Civil war, Cromwell defeating the Royalists there in 1648. P. later became a Jacobite centre. In 1715 the Old Pretender was proclaimed in P. market square; the Jacobite force later surrendered at P. Derwentwater and Kenmore were executed there. In 1745 Prince Charles Edward Stuart visited P. With the rise of industrialism the mansions of the nobility in P. disappeared, among them the mansion of the earls of Derby and that of the duke of Hamilton. P. was represented in Parliament as early as 1295 and possibly earlier. The first temperance newspaper was founded in P. Francis Thompson, the poet, was b. there.

The manuf. of cotton, especially of fine yarns, is the staple industry. Court-auds introduced a new industry, the production of viscous rayon yarn, in 1939. Electrical engineering is second in importance. There are steel and iron foundries, and other engineering manufs. include textile machinery, marine boilers, artesian pumps, and printing machinery. Other activities are wood-pulp, motor spirit, china clay, and coal distribution. Motor and rubber goods are made in Leyland, near P. Maritime trade has greatly increased since the construction of the large docks, and the deepening of the riv., begun in 1884. P. corporation is the responsible authority for the port of P. An airport was estab. jointly by the P. and Blackburn corporations in 1939 at Salmesbury, 4 m. from P. Pop. 111,400.

Preston, tn. near Galt and 28 m. N.N.W. of Hamilton, on the Grand R., in Waterloo co., Ontario, Canada. It is a health resort, with mineral springs, and has woollen mills, furniture factories, and machine shops. Pop. 6700.

Prestonpans, seaside tn. of East Lothian, Scotland, 9 m. E. of Edinburgh, celebrated for the victory of Prince Charles Edward over the royal troops under Sir John Cope, 1745. Fire-bricks, tiles, soap, etc., are manufactured, and there are coal-mines and a brewery. Pop. 2700.

Prestressed Concrete, see under REINFORCED CONCRETE.

Prestwich, Sir Joseph (1812-96), Eng. geologist, acquired a taste for geology during his scientific studies at Univ. College, London. He was appointed to the chair of geology at Oxford in 1874. In 1886 and 1888 he pub. his admirable handbook of *Geology*. He was knighted in 1896.

Prestwich, municipal bor. of Lancashire, England, 4½ m. N.N.W. of Manchester; it has cotton manufs., but is mainly residential. Pop. (estimated) 36,000.

Prestwick, burgh of Ayrshire, Scotland, on the frith of Clyde, some 2 m. from Ayr. It is one of the most popular and widely

known holiday resorts in the S.W. of Scotland. For long known as an excellent golfing centre, it has four 18-hole courses, including the famous old P. championship course. The name of P. became even more widely known during the Second World War because of the adjoining airport. After the Second World War there was considerable discussion on the question of the retention of the airport, but eventually the minister of civil aviation adopted a scheme for providing P. airport with a second runway, 7000 ft. long, to the S. of the present runway; new terminal buildings are to be constructed in the angle of the intersection of the runways. The cost of these developments was estimated at £5,000,000 but their final adoption awaited the decision of the gov. in power in 1953, before which year the work could not be started. The tn. itself is a delightful resort, offering all seaside amenities and pleasures. The esplanade is 1½ m., and there are over 2 m. of broad, sandy beach. P.'s bathing lake, with accommodation for 1200 bathers and 3000 spectators, is one of the largest and best equipped in the country. Pop. 10,000.

Presumption. In the law of evidence Ps. are inferences from facts already proved or admitted. They are commonly classified into (a) *Juris et de jure* or Ps. absolute and irrefutable; e.g. that an infant under seven years of age is incapable of committing a felony. (b) *Juris* or Ps. which hold good only unless and until rebutted; e.g. that a child between seven and fourteen years is incapable of committing a felony, but the proof of its mischievous discretion will destroy the P.; and (c) *Facti* or *homini*, which, however, are mere arguments from probabilities and almost synonymous with circumstantial evidence (q.v. under EVIDENCE). In civil actions there are a number of Ps. of law as to documents, resting upon the authority of decided cases, which greatly facilitate proof; e.g. that alterations and interlineations appearing on the face of a will, in the absence of all evidence relating to them, were made after the execution of the will.

Pretender. see STUART, CHARLES EDWARD; STUART, JAMES FRANCIS EDWARD.

Pretoria, cap. of Transvaal prov., and administrative cap. of the Union of S. Africa, 35 m. N. of Johannesburg, situated on both banks of the R. Aapjes, at the foot of the Magaliesburg Mts. It is an important railway junction, being on the direct line with both Johannesburg and Durban. Sir Herbert Baker built the Union Building and the railway station. The Union Building houses the Premier, ministers and their staffs, agric., mining, commercial, and financial specialists, and the heads of the civil service. In the Raadzaal, at present occupied by the gov. of the Transvaal, took place the debates which preceded the S. African war of 1899. There are sev. churches, the Anglican cathedral of St. Alban's being the most notable. The tn. has a state library of 80,000 vols., sev. museums, and is the seat of the federal univ. of S. Africa. P. univ. was founded

in 1930. There are many schools and a technical college. Onderstepoort, noted for veterinary research, is 10 m. N. of the city. The Radcliffe Observatory was transferred to P. from Oxford, England. There are numerous parks and zoological and botanical gardens; in Oct.-Nov. the jacaranda blossom is a striking feature. Paul Kruger is buried in P. Winston Churchill was a prisoner there in 1899. P. was founded in 1855 by Marthinus Pretorius (q.v.), son of Andries Pretorius, victor of Blood R., after whom it was named. In 1860 it superseded Potchefstroom as the cap. of the Transvaal. In 1900 P. surrendered to Lord Roberts, the Union being constituted nine years later, when P. became its cap. There are iron and steel, cement, pottery, brick, and leather industries, and printing works. Pop. 117,000 (European) 92,600 (non-European). See A. Macmillan, *Environments of the Golden City and Pretoria*, 1934; G. S. Preller, *Old Pretoria*, 1938; M. Nathan, *Paul Kruger: his Life and Times*, 1941; and H. V. Morton, *In Search of South Africa*, 1948.

Pretorius, Andries Wilhelmus Jacobus (1799-1853), Dutch settler in S. Africa and soldier. A leader of the great Boer trek in 1838, into what is now Natal. Early a rival of Hendrik Potgieter who led his voortrekkers (q.v.) much further N. With a small force of farmers P. defeated Dingaan's army of 30,000 impis at the famous battle of Blood R. (Dec. 16, 1838) and so broke the power of the Zulu. This led to the setting up of a republic of Natal, with P. as first president of the first Volksraad of Natal and chief commandant of its forces. This move alarmed Sir George Napier, the Cape governor, who sent troops to Durban and annexed Natal, the Boers realising the hopelessness of resistance. Offers of farms were made to the Boers, but a considerable number of them recrossed the Drakensberg under the leadership of P. and set up new republics between the Orange and Vaal Rrs. But on Feb. 3, 1848, the governor, Sir Harry Smith, proclaimed the annexation of the entire region between those rivers as far E. as the Drakensbergs. Recalcitrant Boers, led by P., were defeated at Boomplaats (Aug. 28, 1848) and P. fled across the Vaal with a price upon his head; yet within six years after that battle the policy of Smith and Lord Grey (colonial secretary from 1846) had collapsed and freedom had been granted to all Boers beyond the Orange. P. early quarrelled with his rival Potgieter, who in 1838 founded Potchefstroom (named after him), oldest tn. of the Transvaal, whence parties of burghers left to settle further inland and prepared to set up their own separate gov. Civil war seemed certain, but ultimately P. succeeded in subjecting all the dists. in the Transvaal to one gov. without loss of life. The city of Pretoria, founded by his son, Marthinus Wessels (q.v.), was named in his honour. A man of integrity and prestige, a Bible reader and preacher, and a commandant who left nothing to chance, P. was pre-eminently fitted to lead the Boer farmers.

Pretorius, Marthinus Wessels (1819-1901), Boer commandant-general and political leader, son of Andries P., whom he succeeded as leader of military forces in 1853 and as President of the Transvaal in 1864. With Field-cornet Paul Kruger in 1854 he led the Boer punitive force against the chieftain Makapaan—who had massacred Boer women and children while their menfolk were absent hunting—drove Makapaan and his men into a cave, and there disposed of them. P. tried to go further than his father and marched with a commando to bring the Orange Free State under his rule; but in this he did not at first succeed, and, at the Vaal R. matters were settled amicably. Between 1857 and 1869 he was thrice elected president of the new S. African republic. As President of the Orange Free State (1859-63) he made every effort to reconcile the Free Staters to amalgamation with the Transvaal. He also tried, unsuccessfully, to annex Bechuanaland and Delagoa Bay. Following the first Brit. annexation of the Free State (1877) P., together with other rebel Boer leaders, joined the insurgent movement, but in 1880 the independence of the Free State was recognised. He was one of the leaders in the Free State until the election of Paul Kruger in 1883.

Preussisch-Eylau, tn. of Poland in the former Ger. prov. of E. Prussia, 23 m. S.S.E. of Kaliningrad (Königsberg). A famous battle was fought here on Feb. 7-8, 1807, between the Fr., under Napoleon, and the Russians and Prussians. Pop. 4300.

Prevention of Crime Acts. The Prevention of Crime Act, 1871, provides for the arrest and punishment of convicts out on licence under the Penal Servitude Acts. It enables a court of summary jurisdiction to forfeit the licence if it appears that the holder is getting a dishonest livelihood. In any case, holders had to notify their place of abode to the police within forty-eight hours of their arrival in any place. This provision is abolished by the Criminal Justice Act, 1948. Instead, certain categories of offenders with at least two previous convictions, after release from prison can be placed under the supervision of a named society or individual. Further, a court of summary jurisdiction can award imprisonment, not exceeding one year, to persons who have on former occasions been twice convicted of crime, and who within seven years from their last conviction are guilty of certain offences or, rather, conduct which leads to the inference that they are again contemplating crime; e.g. they may be so imprisoned: (1) if they refuse to give their names and addresses, or give false ones; (2) if found in any place under such circumstances that the court is satisfied that they are about to commit a crime, and in any case if it appears that they are getting a dishonest livelihood; and (3) if found in any premises or grounds without being able to give a satisfactory account of themselves. The police have power under this Act to search for stolen property in premises which, within the last twelve months,

have been in the occupation of persons convicted of receiving stolen property or harbouring thieves, or are, in fact, occupied by persons who have been convicted of crimes involving fraud and dishonesty. The Home Office is empowered under this Act to make regulations for photographing prisoners, and due provision is made in the Act for the keeping of a register of prisoners by the Scotland Yard authorities for purposes of identification (*see also* FINGER PRINTS). By the Prevention of Crime Act, 1908, a prisoner who pleads or is found guilty of an indictable crime involving a sentence of penal servitude may, in certain circumstances (*see* CRIMINAL LAW), be charged as an 'habitual criminal.' If found guilty on such further charge, the court could add to his sentence for the specific crime a sentence of 'preventive detention' for any period of from five to ten years. Persons undergoing preventive detention are confined in prisons set apart by the Home Office for that purpose, and subjected to such disciplinary and reformatory influences, and employed on such work as may be best fitted to make them able and willing to earn an honest livelihood on discharge. Under the Criminal Justice Act 1914, preventive detention can only be ordered for persons over thirty years of age with at least three previous convictions on indictment. It does not now involve an additional sentence, but a single sentence of from five to fourteen years. The Act also provides for the reformation of young offenders (not less than sixteen nor more than twenty-one years of age), convicted of an offence involving imprisonment, by enabling the court to pass sentence of detention in a Borstal institution for a term of not less than one year or over three years; the minimum of one year was raised to two years under the Criminal Justice Administration Act 1914, and under the Criminal Justice Act, 1948, the sentence must always be for three years. It is further provided by the Act of 1914 that the young offender shall be under supervision until the end of one year after the conclusion of the full period of detention (i.e. with a three-year sentence until the conclusion of the fourth year from the date of sentence). In the event of unsatisfactory behaviour during the period of supervision he may be recalled to a Borstal institution. Further provision is made for the reformation of young people by the Children and Young Persons Act, 1933, which provides that in dealing with a child or young person the court shall have regard to his welfare by removing him from undesirable surroundings and providing for his education and training. A court may not order a child under the age of ten years to be sent to an approved school (*q.v.*) unless for any reason, including the want of a fit person of his own religious persuasion who is willing to undertake the care of him, the court is satisfied that he cannot suitably be dealt with otherwise. The Children and Young Persons Act, 1938, extends the powers of the courts of summary jurisdiction as to

the making of orders for the protection, custody, supervision, and care of children and young persons, and for their temporary detention. A juvenile court's power to revoke an order committing a child or young person to the care of a fit person includes also power to substitute an order placing him for a period not exceeding three years under the supervision of a probation officer or some other person approved by the court.

Prevention of Cruelty to Animals, see ANIMALS, CRUELTY TO.

Prevention of Cruelty to Children, see CHILDREN, SOCIETIES FOR PREVENTION OF CRUELTY TO; CHILDREN ACT, 1908.

Preventive Medicine is that branch of medicine which aims at the avoiding of disease by application of the principles of hygiene (*q.v.*), both personal and public. Personal hygiene promotes the health of the individual, so that he will be better fitted to withstand infection and less liable to acquire disease; it ranges from the pre-natal care of the foetus and the mother to the science of geriatrics, or the health of old age, which is now being increasingly studied. Personal hygiene includes the cleanliness of the body which is so essential, especially in the tropics, for the avoidance of skin infections and external parasites (such as lice and fleas which are themselves able to transmit disease); care of the teeth and mouth, and of the hair, is also important. Public hygiene, or public health, is controlled by appropriate Acts of Parliament, administered by the Ministry of Health and by local authorities; it is concerned with such matters as the provision of adequate water supplies and the proper disposal of sewage, the safeguarding of food and especially milk, superintendence of buildings, and so on. Many infectious diseases, as, for instance, measles, smallpox, scarlet fever, typhoid, puerperal fever, and diphtheria, must by law be notified to the local medical officer of health, so that steps can be taken to prevent their spread. The numerous occupational diseases are also controlled by legislation. Under the National Health Act of 1946 medical attention and hospital treatment is available to all inhab. of Great Britain. P. M. is of particular importance in tropical dists., where diseases such as malaria, yellow fever, and sandfly fever, with insect vectors, and others caused by intestinal parasites, are rife and could be controlled, or even prevented entirely, by the application of adequate preventive measures. **See also CHILD; DIET; FOODS AND FEEDING; HYGIENE; PUBLIC HEALTH; SANITATION; SEWAGE; VENEREAL DISEASE; WATER.** **See J. R. Currie and A. G. Mearns, *Manual of Public Health Hygiene*, 1948, and W. M. Frazer and C. O. Stallybrass, *Text-book of Public Health* (12th ed.), 1948.**

Preventive Service, see COASTGUARD.
Preveza, tn. and dopt. of Epirus, Greece, at the entrance to the gulf of Arta, 49 m. W. of Fanina; exports cheese, butter, wool, olives, and oil. Pop. (tn.) 8800, (dopt.) 77,400.

Prévost, Eugène Marcel (1862-1941).

Fr. novelist and playwright, *b.* in Paris. His first successful novel was *Le Scorpion*, 1887. Others included *Chonchelle*, 1888; *Lettres de femmes*, 1892; *Les Demi-Vierges*, 1891 (produced on the stage, 1895); *Monsieur et Madame Moloch*, 1906. *La Plus Faible* had a popular run at the Comédie Française, 1904. P. was admitted to the Academy in 1909. His later works include *Mon cher Tommy*, 1920; *L'Art d'apprendre*, 1922; *Sa maîtresse et moi*, 1925; *L'Homme vierge*, 1929. **See P. Valéry and H. Bordeaux, *Marcel Prévost et ses contemporains*, 1943.**

Prevost D'Exilles, Antoine François (1697-1763), Fr. writer, *b.* at Hesdin in Artois, and generally known as the Abbé P. He was brought up by the Jesuits, but abandoned monastic life for military life, then re-entered a monastery, and finally left France for Holland and London. In 1734 he returned to Paris as chaplain to the prince de Conti. He wrote many novels, mostly long and diffuse stories of love and adventure. He is famous chiefly as the author of *Manon Lescaut* (1731), his one masterpiece, pub. as part of the *Mémoires d'un homme de qualité*, the first part of which appeared in 1724. Other works of note are *Fils naturel de Cromwell* (1732), and *Histoire générale des royaumes* (1745-70). As the translator of Richardson's *Pamela* and *Clarissa Harlowe* P. exercised a considerable influence on the literature of his day. **See life by H. Harriette, 1896, and E. Lasserre, *Manon Lescaut et l'abbé Prévost*, 1930.**

Prevost, Jean (1901-44), Fr. writer, *b.* at Goderville. His work belongs to the school of Alain; he analysed the life of the senses with clarity and vision. He was killed in the resistance movement during the Second World War. His pub. include *Dix-huitième Année* (1927); *Epicuriens français* (1931); *Le Sel sur la pluie* (1935); and *Ursonie* (1939).

Preysing, Konrad von (b. 1880), count of Lichtenegg-Mons, and Ger. cardinal from 1946, *b.* at Kronwinkl. After a diplomatic career, he became a priest in 1912, being made bishop of Eichstätt in 1932, and of Berlin in 1935. With Cardinals Faulhaber and von Galen (*q.v.*) he was one of the chief leaders in the Ger. Catholic resistance to the dictatorship.

Priamus, or Priam (Ἰκ. Πριάμος), king of Troy at the time of the Trojan war, was the son of Laomedon. Being an old man he took no active part in the famous conflict between the Gks. and the Trojans. He took refuge at the altar of Zeus when the Gks. entered Troy, and having witnessed the death of his son Polites, hurled his spear at his pursuer Pyrrhus, by whom he was forthwith killed. He was the husband of Hecuba, by whom he was the father of Hector, Paris, Deiphobus, Polites, Polydorus, Troilus, Creusa, Polyxena, and Cassandra.

Pribilof or P. bylov Islands, volcanic is. in Bering Strait, Alaska, U.S.A., the centre of important seal fisheries. The total area of the group is 170 sq. m., the largest is. being St. Paul and St. George. **Pfibor, see FREIBURG.**

Pfibrum, tn. in Bohemia, 33 m. S.W. of Prague. It has the most important silver and lead mines in Czechoslovakia (worked since 1330). Near P. is the Hellige Berg, a much frequented shrine. Pop. 10,500.

Price, Harry (1881-1948), Eng. psychic investigator, b. in London. He founded and equipped (1925) the first laboratory in Britain for the scientific investigation of abnormal happenings, publishing the results of his researches in Britain and abroad in numerous books, among the best known being *Pollergeist over England* (1945) and *The End of Borley Rectory* (1946); he investigated the claims of the prin. mediums and visited scores of haunted houses in Britain and sev. European countries. He formed a library of over 20,000 vols. on ghosts, magic, and allied subjects, which he presented to the univ. of London. See his autobiography, *Search for Truth* (1942), and P. Tabori, *Harry Price—Companion of the Unseen*, 1950.

Price, Lillian Nancy Bauche (b. 1880), Brit. actress, b. at Rochmount, Kinver. She was educated at Malvern and first appeared on the stage in 1899 at Birmingham. She is most famous as a character actress, especially in such roles as Mrs. Alving, in *The Ghosts*, and Adeline in *Whiteoaks*. She has also appeared in films. In 1930 she founded the People's National Theatre. She pub. her memoirs, *Shadows on the Hill*, in 1936 and has also written *Fagabond's Way*, *The Wonder of Wings*, and *Where the Skies Unfold*.

Price. P. is value in exchange in terms of money. The P. of an article is the sum of money paid for it. A wage is the P. of labour; and a rent is the P. of the use of land. To say that Ps. have risen is to say that the value of money has fallen. A general rise in P. indicates a rise in the quantity of money. According to the original Quantity Theory of Money, if the quantity of money is increased Ps. increase proportionately. Such a crude statement needs adjustments to relate it closely to fact. Money must be taken in the modern sense to include not only bank-notes but bank-money (demand deposits); and allowance must be made for expectation as well as for money substitutes and arrangements which economise the use of money. An increase in the volume of trade will require a more or less proportionate increase in the amount of money. Again, an increase in the 'demand' for money (the desire to hold money) will reduce its velocity and be equivalent to a reduction in quantity. Decreases will have opposite effects. With these qualifications the quantity theory may be looked to, not for mathematically accurate results, but for a useful indication of tendencies. If all Ps. double, relative values are undisturbed. Thus, although there may be a general rise in Ps., there can be no general rise in values. Under conditions of perfect competition there can be only one P. for identical articles at any one time in the same market. This P. equates, or tends to equate, the quantity offered and the quantity

demanded. The Normal P., on the other hand, is that which tends to persist over a lengthy period. The normal P. tends, under conditions of perfect competition, to equal the marginal costs of production (including normal profit), supply being increased by a rise in P. and restricted by a fall. While increase in P. will tend to increase supplies the increase in supply may, in turn, either tend to reduce P. (in conditions of increasing returns) or to increase P. (in conditions of decreasing returns). Demand, on the other hand, may be relatively elastic or inelastic: an elastic demand will respond markedly to a rise or fall in P.; an inelastic demand will persist substantially in spite of P. variations. P. thus plays a great part in regulating economic activity and adjusting it to the needs of mankind—or at least to the requirements of purchasers.

It is sometimes denied that the quantity of money is the great determinant of the P. level and maintained that the contrary is true—that the level of Ps. determines the amount of money. This counter-argument is valid only while the authorities are content to furnish whatever money is required by the volume of trade and the level of Ps. If the level of Ps. tends upwards owing, for example, to wage pressure, the gov. may meet (potential) inflation by monetary or non-monetary measures. Non-monetary measures could take the form, as in 1949, of an attempt to restrict wage increases; while monetary measures mean a deflationary reduction of bank-money by restricting loans (and selling securities). Deflation was a gold standard feature, involving unemployment. (See MONEY.)

The condition of perfect competition tends to be unattainable in these days of P.-fixing and monopoly; and with 'imperfect competition' there is no presumption that P. will no more than equal marginal costs of production. The monopolist can either fix his P. or alternatively fix his output; he cannot do both at the same time. The public like fixed-P. branded goods, and the question of manufacturers enforcing retail Ps. has recently been studied by the Resale P. Maintenance Committee, whose report was pub. in March 1949. The committee 'are satisfied that the elimination of price competition over the greater part of the distributive trades is not consistent with... maximum efficiency and economy...' and have been concerned to mitigate the harmful effects of resale P. maintenance as now in operation, and guarantee a substantial degree of flexibility in distribution. Their recommendations make a big distinction between the use of sanctions by an individual producer and by associations. They recommend continued liberty for the individual producer to apply sanctions in support of his fixed P., but recommend at the same time that it should be made illegal for associations of traders to apply such sanctions. The committee favours the double P.; one for 'cash and carry,' and another for delivered goods. In the U.S.A. the self-service has made great progress, and accounts for a high

proportion of retail trade. Monopolistic practices are not confined within national boundaries. The control of diamond Ps. is world-wide; and both tin and rubber have been subject to international restriction (of production or of export) schemes, and, in the case of tin, to the creation of a 'buffer stock' in the hands of the international body, for the purpose of steadying the market in an unforeseen emergency.

In order to measure the value of money at different periods it is necessary to make a P. index—to record the Ps. of a large number of commodities (and services), and to 'weight' them in accordance with the quantities considered to be appropriate to the purpose. Comprehensive indexes are a comparatively modern device and regard is had to wages or a basic commodity such as wheat to get an idea of the value of money in pre-index times. (Gold Ps. are often quoted as representing real values as against 'paper' values; and where gold Ps. have themselves kept stable this is often convenient; but a criterion is necessary by which to determine whether gold itself has kept stable.) Even the best indexes have their limitations, however, and it is important to bear this in mind when using the best available index to give the relative values of money at different times. The Ministry of Labour Cost-of-Living Index measured P. changes from July 1911 in a working-class budget of 1904-14. It had risen to 56 per cent (above 1914) in 1938 and to 103 per cent in June 1947, when it was discontinued. Pending the estab. of a new basis for a permanent index, it has been replaced by an Interim Index of Retail Ps. based on the 1937-38 pattern of working-class expenditure (but not purporting to show the rise in the cost of living since 1937-38). Wholesale P. indexes, while often more comprehensive, are in theory clearly inadequate to measure the value of money since the consumer pays retail Ps.; nevertheless they have manifest advantages, and similar discrepancies at different dates tend to cancel out. The cost of living index reflects inadequately the change in the value of money not only because the typical 1904-14 budget is not the typical budget of 1947, but because so many of its components were subsidised during the Second World War and after.

While the value of money is the reciprocal of the general P. level, the P. of money is the rate of interest. The P. of money may move quite differently to general Ps. After the Second World War general Ps. rose, but the P. of money fell. A 'cheap money' policy had made the Second World War a '3% war' as against the 5 per cent paid on long-term loans in the First World War. Short-term rates were also much reduced, 'cheap money' policy having reduced bank rate to its present low level of 2 per cent in 1932. At that time of industrial depression the 'weight of money' pressed down the rate of interest: to-day controls serve to keep money cheap. The post-war fall in the P. of money marked a reinforcement of cheap money policy with

heavy cuts in the rates for Treasury bills and Treasury deposit receipts; but long-term rates have risen appreciably since. By driving down the rate of interest a cheap money policy drives up the P. of stocks and shares; and so presents the holders with large capital gains.

A rate of exchange provides two Ps., e.g. the P. of £s in francs and the P. of francs in £s.

St. Thomas Aquinas favoured the 'just price,' the P. which gave labour no more than its accustomed standard of life, and throughout the Middle Ages Ps. were under control, not only by Church and State, but by the gilda. The Black Death in the fourteenth century played a notable part in breaking up the estab. P. for labour; and Ps. for both goods and labour rose rapidly in response to the currency debasement of Henry VIII. and the influx of gold and silver from the Americas.

The following figures give some idea of the course of Eng. Ps. from the Middle Ages onwards

	Agric. Labourer's Wage	Wheat per Quarter
1261-1350	2½d per day *	5s 9½d.
1351-1400	3½d per day *	6s 1½d.
1401-1510	4d per day	5s 1½d.
1511-1542	6½d per day	13s 10½d.
1583-1612	4s 10d per week	36s 1d
1613-1702	6s 4½d per week	41s 1½d.

* 1 hatchet

(Palgrave's Dictionary of Political Economy, quoting Prof. Thorold Rogers.)

Salient United Kingdom Wholesale Price Index Numbers

1782	100	1860	99	1908	71
1786	85	1864	105	1913	85
1809	157	1870	96	1920	251
1816	91	1873	111	1923	128
1818	132	1879	83	1924	139
1833	75	1880	88	1933	78
1839	92	1887	68	1937	102
1840	64	1890	72	1938	90
1847	85	1896	61	1940	128
1858	79	1900	75	1945	164
1860	79	1902	69	1946	186
		1907	80	1917	230

Jevons
(1782 = 100)

Sauerbeck Statist
(1867-77 = 100)

Journal of the Royal Statistical Society,
June 1865, & 1948 (IV).

See also MONEY; VALUE; INFLATION AND DEFLATION. See A. Marshall, *Principles of Economics*, 1920; I. Fisher and H. G. Brown, *The Purchasing Power of Money*; D. H. Robertson, *Money*, 1928; J. M. Keynes, *Treatise on Money*, 1930; W. T. Layton and G. Crowther, *An Introduction to the Study of Prices*, 1935; and M. Curtis and H. Townshend, *Modern Money*, 1937.

Price Level Policy, see under MONEY.

Prichard, Harold Arthur (1871-1948), Eng. philosopher. Educated at Clifton and New College, Oxford, he was a fellow of Hertford College, Oxford (1895-98); fellow and later tutor of Trinity College (1898-1924), and White's prof. of moral philosophy at Oxford from 1928 to 1937. His most important work was done in the spheres of moral philosophy and the theory of knowledge. He was one of the founders of realism, and in moral philosophy the leader of the intuitionist school or 'Oxford Moralists.'

Prickling at the Belt, see FAST AND LOOSE.

Prickly Heat, or *Millaria Populosa*, skin disease common in tropical and sub-tropical lands. It is characterised by inflammation of the sweat-glands, leading to the formation of small red papules, and accompanied by a prickling or tingling sensation. It usually follows an excessive flow of perspiration; it is unaffected by any treatment.

Prickly Pear, see OPUNTIA.

Pride, Thomas (d. 1658), Eng. soldier; he entered the parli. army in 1644 and distinguished himself at Naseby. In 1648, to prevent an agreement with the king, P. stopped nearly a hundred members from taking their seats in Parliament, an act which is known as 'Pride's Purg.' He was a commissioner at the trial of the king and signed the death warrant.

Priene, anoth. city of Ionia, Asia Minor, some 6 m. N. of the Maeander. Excavations conducted by the Eng. society of Dilettanti (1765 and 1868) and by the Ger., Th. Wiegand (d. 1899), confirmed the traditional prosperity of the city in the fourth and third centuries B.C. See M. Schöde, *Die Ruinen von Priene*, 1934.

Priest, shortened form of presbyter (Gk. *πρεσβυτερος*, an elder), minister of public worship, to whom it belongs especially to perform the sacrificial rites pertaining thereto. It seems evident that, in the primitive stages of society, these duties belonged to the head of the family. A later development made the head of the clan the natural representative in religious matters, and this stage can be seen in the biblical accounts of the patriarchal age. As the organisation of society became more defined, the priestly office was in many cases associated with the king. In other religions, such as those of Egypt and India, the Ps. form a separate caste. The Jewish priesthood, inaugurated by the Mosaic law, was elaborately developed, and there is a parallel between the Jewish and Christian systems. The Christian hierarchy was not fully developed until post-apostolic times. In it the priesthood forms the second grade of the sacred ministry, exercising many, but not all, of the functions of the higher grade of the episcopate. To the P. belong especially the functions of offering sacrifice, ministering the sacraments, of blessing, and of preaching. See APOSTOLIC SUCCESSION; HOLY ORDERS; and articles on the various religions.

Priesthood, see under PRIEST.

Priestley, John Boynton (b. 1894), Eng. author; b. at Bradford, Yorkshire, and

educated at Bradford and Trinity Hall, Cambridge. He served during the First World War. After leaving Cambridge P. became a reader for John Lane and estab. contacts with the *London Mercury*. He wrote *George Meredith* (1926) and *Thomas Love Peacock* (1927) for the English Men of Letters series, but his chief interest lay in creative, rather than critical literature. In 1918 he pub. *The Chapman of Rhymes; Brief Diversions* followed in 1922. His early novels included *Adam in Moonshine* (1927); *The Good Companions* (1929); and *Angel Pavement* (1930). *The Good Companions* was a phenomenal success, being a rollicking story rather reminiscent of the Dickens manner of narration and in the picaresque tradition of Fielding. *Angel Pavement*, a sombre story of middle-class life, was also extremely successful, and has been declared by some critics to be his best work; others have preferred *Bright Day* (1946) pointing out that this combines many sides of P.'s literary talent. Other novels include *They Walk in the City* (1936); *Let the People Sing* (1939); *Black-out in Gretey* (1942); *Three Men in New Suits* (1945); and *Jenny Villiers* (1947). P. has also written for the theatre. *Dangerous Corner*, a character-study, was produced in 1932. *Time and the Convoys*, and *I have been here before* (1937) are usually considered his greatest contribution to the Eng. theatre. They are time-studies, which, while owing something to the theories of J. W. Dunne and Ouspensky, show exceptional imaginative capacities and sympathy. P.'s later plays dealt mainly with social subjects. *They Came to a City* (1943) was a symbolic drama; *The Linden Tree* (1947) showed P.'s ability to draw sympathetic characters of the political sides to which he was opposed; *To-morrow will be Better* (1948) was a plea for international co-operation through United Nations Organisation. During the Second World War P. broadcast a famous series of 'Postscripts' after the 9 p.m. Sunday news which admirably portrayed the character, opinions, and aspirations of Englishmen at war. His ability to make a broadcast into a personal 'fireside chat' has made him also an excellent writer of autobiographical studies. *Delight* (1949), notes on the things which have delighted him most in life, is a good example of this type of writing.

Priestley, Joseph (1733-1804), Eng. chemist and divine, b. at Fieldhead, near Leeds, and educated at Dovershire, then entered a dissenting academy. In 1755 he became a dissenting minister at Needham Market, and at Nantwich in 1758. In 1761 he became a teacher in Warrington. He met Franklin in London, and pub. *History and Present State of Electricity* (1767); LL.D. Edinburgh (1764), F.R.S. (1766). He was literary companion to Lord Shelburne (1773); and was in Paris with him (1774). P. became a minister in Birmingham (1780-91); it was here the mob burnt his house, books, MSS., and scientific instruments. Being left £10,000 and £200 annuity by his brother-in-law, he

settled in Pennsylvania (1794). He commenced chem with carbon dioxide of fermentation in brewery; discovered oxygen from mercuric oxide, etc. He carried out further researches on nitric oxide, hydrochloric acid, sulphur dioxide, ammonia, air, carbon monoxide, and silicon fluoride, examined effect of different gases on the respiration of animals and plants, applied carbon dioxide to aerated water, greatly improved the pneumatic trough. *P's Works* were ed. by J. F. Rutt 1817-1832. See the lives by F. E. Thorpe, 1906,



JOSEPH PRIESTLEY

Engraving from a picture by Gilbert Stewart

A. Holt, 1931, and D. McKie 1949. See also H. Pearson *Darwin and his Circle* and *Doctor Darwin*, 1930 and Sir P. Hartog, *Joseph Priestley and his Place in the History of Science* 1931.

Prignano, Bartolommeo, see **URBAN**, Urban VI.

Prilep, tn of Macedonia, Yugoslavia. Pop. 25,800.

Primage, small sum of money over and above the freight charges paid to the master of a ship for his care of the goods. *P* which was known as 'hat money' is now included in the freight and retained by the shipowner.

Primary Colours, see **SPECTRUM**.

Primate in the Rom. Church the bishops of certain sees which anciently had attached to them the positive of vicar of the holy see. They have however no primatial jurisdiction. In the Church of England, the title belongs only to the two archbishops, the archbishop of York bears the title of *P* of England, while the archbishop of Canterbury is *P* of All England.

Primates, term invented by Linnaeus to define the first order of the class Mammalia. By Huxley and other authori-

ties, man is included, though there are some who place him in an order apart. *P* include all the apes, monkeys, and marmosets, as well as the lemurs, which bear a closer resemblance to monkeys than to any other animals, and are, therefore, agreed to belong to the order, though ranked apart as the sub order Lemuroidea, on account of their lower organisation and inferior intelligence. The order is characterised throughout by milk and adult dentitions. As a rule, both fore and hind limbs bear five digits each, the thumb being usually but not invariably, present, and, except in man, the large toe is opposable to the other toes, with the same exception, *P* are mainly arboreal in habit and are confined to warm climates.

Prime, in the Rom. Catholic and Gk. Churches is an office said in the first hour after sunrise following matins and lauds.

Prime Minister, or Premier. The *P* or Premier, although the *de facto* head of the Cabinet and the most important personage in the kingdom is an official unknown to the law but in 1805 Edward VII recognised the existence of the position and gave the *P* M a definite precedence, next after the archbishop of York. Estab. usage, however not only clearly defines his powers and privileges and his relations with the Crown (as to which see under **CABINET**) but usually combines with the first that of first lord of the Treasury, foreign minister, or some other important Cabinet office together with a privy councillorship. Walpole is generally assumed by historians to have been the first *P* M but he was not asked by the king to form a ministry or to choose his colleagues the two duties which are the constitutional authorisation for a *P* M's assumption of office but he entered the Cabinet at the behest of George I and gradually thereafter by his dominant personality acquired the leadership though apparently it was his very assumption of premiership that led to his fall. The office exists in some of the self-governing colonies but though nominally there is a *P* M and always in other continental countries some leading minister, whether called *P* M or not, such minister does not possess the same executive power and does not depend to the same extent on the retention of a parliamentary majority (see **PARLIAMENTARY GOVERNMENT**) as the *P* M.

Prime Number, number which is indivisible without a remainder, save by itself and unity.

Primitive Land Tenure, see **LAND TENURE**.

Primitive Methodism was founded in 1801 by Wm. Clowes of Burslem and Hugh Bourne of Stoke on Trent. Its form of service differed from Wesleyan Methodism (*q.v.*) in its inclusion of singing and revivalist exhortations. The name Primitive Methodist was adopted in 1812 and, as is usual where persecution is bitter, the cause finally surmounted the many obstacles placed before it and by 1852 the movement was well organised, not only in Great Britain, but as far afield as Australia, New Zealand, and S.

Africa, and the U.S.A. To-day in the U.S.A. there are about a hundred Primitive Methodist churches with a membership of 12,000, while in Canada membership totals over 8000, with 100 effective churches. In London at the centre of Whitechapel, Thomas Jackson began a remarkable work of social service in the eighties of last century, particularly his 'Home for Friendless and Orphan Lads.' Primitive Methodists were reunited with the parent body in 1932 as part of the Methodist Church. *See also* METHODISM.

Primitive or Early Norse Language, see under NORSE LANGUAGES.

Primitive Painting, general term used to denote the art of the early formative years of modern European painting, beginning in Italy at the end of the twelfth century, and ending in Italy during the fifteenth century and in N. Europe some decades later. Evolving from fresco-painting, P. P. shows a concentration on line, flat colour-blocks, and decorative rather than strictly accurate composition, being aimed primarily at illustrating some teaching of the Church. While they had freed themselves from the stylised, artificial pattern-painting which had gone before, the primitive painters often distorted and drew out of proportion, owing to their lack of anatomical knowledge and failure to master perspective. P. P., however, was never really static: it was developing all the time towards the styles of Raphael, da Vinci, and the Van Eycks. The later paintings of the primitive school frequently show a mastery of perspective and a tendency to 'solidify' by some use of shading. A comparison between the work of Cimabue, Giotto, and Fra Lippo Lippi will illustrate the breadth of development which took place within P. P.

Primo de Rivera y Orbaneja, Marqués de Estella, Miguel (1870-1930), Sp. statesman, b. at Jerez de la Frontera, and educated at Madrid Military Academy. He campaigned in Morocco, 1893, and in 1895, in Cuba. He was in the Philippines, 1897. After more fighting in Morocco, became governor of Cadiz, 1915, but was deprived of that post for an imprudent speech, 1916. In 1922 P. was appointed military governor of Barcelona. During the summer of 1923, he organised military revolution. His resignation was demanded; but the king, refusing to sign the Prime Minister Alhucemas's plan for suppressing the revolt, sent for P. (who had already on Sept. 13, issued a manifesto demanding dismissal of the Cabinet), and made him president of a military directorate, suspending the constitution indefinitely. P. formed the Unión Patriótica in imitation of Fascism. His greatest achievement was the solution of the Moroccan affair. He conducted the retreat that ended successfully in Dec. 1924, and was followed by the victories of 1926. In 1925 he dissolved the directorate, and became Premier of a gov. into which he had introduced a civilian element. The only result of this was that he began to be unpopular with the army. His action in consulting army and naval officers as to whether he should resign

caused the king to insist on his immediate resignation, Jan. 28, 1930.

Primogeniture, state of being the first-born child of the same parents; in King, law the term has become more specialised and denotes the right (abrogated in 1925) by which, on intestacy of the father, the eldest son or his issue succeeded to the real estate to the absolute exclusion of the younger sons and daughters (*see also* HEIR; INTERSTATE; PORTIONS; SUCCESSION). For the various forms of P. in anct. legal systems reference should be made to Maine's *Ancient Law* (chapter vi.), where it is pointed out that in some anct. systems it was not always the eldest son or his issue who took up the succession, but sometimes the next brother succeeded in priority to all grandsons, especially when the succession was not to civil but to political power; and again, in polygamous societies the form of P. always tended to vary. There is no trace of the normal form of P. among the Romans, and it seems certain that it is feudal in its origin, and was the customary manner by which the huge military benefices of the Carolingian Empire were held by subinfeudatories.

Primorska, prov. of Yugoslavia. Cap. Split (Spalato). Area 7580 sq. m. Pop. 900,000. *See also* ASPHALTOS.

Primrose, Archibald Philip, see ITOSBERRY, EARL OF.

Primrose (*Primula*), genus of herbaceous plants (family Primulaceæ). The common P. (*P. vulgaris*) is one of the most cherished Brit. flowers; a number of varieties of it are grown in gardens. *P. veris* is the cowslip. The hybrid between P. and cowslip is often wrongly known as the oxlip; the true oxlip is *P. elatior*, a rare species found in the E. cos. of England. *P. farinosa* is the beautiful bird's-eye P. found growing on limestone, the leaves are mealy on the lower surface (thence *farinosa*). A number of species of the genus are valuable garden and greenhouse plants, the interest in which is increased by the ease with which they are cross-fertilised. The auricula (*P. auricula*, dimin. of Lat. *auris*, an ear, referring to the shape of the leaves), Chinese P. (*P. sinensis*), and *P. obconica* are among the more important species from which many valuable hybrids have been derived.

Primrose League, Brit. organisation for spreading Conservative principles. It was instituted in 1883 by Lord Randolph Churchill, Sir H. D. Wolff, Col. F. Burnaby, Sir J. Gorst, and others, and is so called because the primrose was said to be the earl of Beaconsfield's favourite flower. Its objects are 'the maintenance of religion, of the estates of the realm, and of the imperial ascendancy of Great Britain.' The badge consists of the letters P. L. surrounded by primroses, and the seal is three primroses. It has a membership of between two and three millions.

Primulaceæ, family of herbaceous plants which include some of the most popular wild and garden flowers. *Hottonia* (water violet), *Primula* (primrose, g.r.), *Cyclamen* (swallowtail, g.r.), *Lysimachia* (loosestrife), and *Anagallis*

(pimpernel, *q.v.*) are among the more important genera, which occur chiefly in the cooler parts of the N. hemisphere.

Prince (Lat. *principes*, chief), epithet applied originally to the *principes senatus* at Rome, later adopted by the emperors from Augustus onwards. Hence it came to be used for one of the highest rank or holding the highest place and authority, and may mean the sovereign or ruler of the state. It more usually implies the son of a king or emperor, the issue of a royal family, or the head of a principality or small state. A territorial title is often attached, thus in England, the eldest son of the reigning sovereign is always P. of Wales. Germany distinguished between the sovereign 'Prinz' and the 'Fürst,' merely one of a princely family. In Italy, as in anct. France, P's. rank next to dukes.

Prince Albert, tn. of Saskatchewan, Canada, on the N. Saskatchewan R., and the Canadian Pacific Railway, 100 m. N.E. of Battleford. The water-power of the Laclois Falls has been developed since 1911. Lumber, grain, fish, and cattle are produced, and there are creameries, meat-packing plants, tanneries, bottling works, grain elevators and mills, and wood-working plants. Pop. 14,500.

Prince Albert's Regiment, see SOMERSET LIGHT INFANTRY.

Prince Charles Spaniel, see under SPANIEL.

Prince Edward Island (formerly *Isle St. Jean* till about 1799), smallest but most densely populated prov. of the dominion of Canada, in the gulf of St. Lawrence, separated from Nova Scotia and New Brunswick (S. and W.) by Northumberland Strait. It is 140 m. in length and varies from 4 m. to 34 m. in width, and has an area of 2184 sq. m. It has deep bays dividing the is. into three natural peninsulas, almost corresponding to the three cos., King's, Queen's, and Prince's. It has a climate tempered by the surrounding waters of the gulf and yet free from the rigours of Atlantic storms. Its rich red soil and red sandstone formations make up a distinctive and even topography, no point in the is. attaining a greater altitude than 500 ft. above sea level. The surface is gently undulating, and the soil fertile, producing fine crops of oats and potatoes. Wheat, barley, and other cereals are also grown; cheese factories and creameries were first estab. in 1892; and cattle are reared. Forest land still covers nearly a third of the is. Fisheries are important, especially the lobster and oyster fisheries. The total value of the fisheries in 1947 was about \$2,897,281. The waters adjoining P. E. I. comprise by far the most valuable section of the fishing grounds of America. The prov. is noted for its relative predominance in the fox-farming (silver-black foxes in captivity) industry (the value of pelts sold in 1947-48 was estimated at \$549,362), its lobster canneries, and its production of oats and potatoes. There are good oyster beds in Richmond Bay and elsewhere. The farmland occupied is about 1,970,000 ac. Field crops in

1947 covered nearly 485,000 ac. (oats, 122,000; wheat, 5000; barley, 10,000; mixed grains, 65,000; potatoes, 43,000; roots, 12,000; hay and clover, 226,000). The trade of P. E. I. is chiefly with the other provs. of Canada, but fox pelts are shipped to the U.S.A. and European markets. Three ferries operate between P. E. I. and the mainland. There has been daily steamship communication since 1917. There are dominion experimental farms and stations at Charlottetown and Summerside Fox Ranch. Chief manufs. or industries: butter and cheese, fish-curing and packing, flour and grist mills, printing and publishing, castings and forgings, bread and bakery products, sawmills, electric light and power. Education is free and non-sectarian and compulsory between seven and thirteen. There is a Rom. Catholic univ. not under gov. control. Prince of Wales College is head of the prov. schools system. Responsible government was estab. in P. E. I. in 1851. Four members are sent to the Senate, four to the House of Commons of the Dominion Parliament. The is. has its own lieutenant-governor, and an executive council, and legislative assembly of thirty members elected by the people. Discovered by Cartier in 1534, the is. was first settled by the Fr., who held it for many years as a fishing station. The Eng. took it from them in 1745 but subsequently restored it; they seized it again however, during the Seven Years war (1763) and compelled the greater part of the Fr. inhab. to leave, and from that time it has remained Brit. It was admitted to the dominion in 1873. The chief tns. are Charlottetown (with Royalty, 14,800 ac.) and Summerside (5000), the former being the seat of a Rom. Catholic bishopric. A line of railway crosses the is., belonging to the dominion gov. Its length, with branches, is 286 m. A railway connects Belfast and Murray Harbour (50 m.), and one of the longest bridges in Canada spans the Hillsboro R. There are railways to Montserrat and Vernon R. Bridge. Pop. 95,000. See G. Sutherland, *History of Prince Edward Island*, 1861; D. Campbell, *History of Prince Edward Island*, 1875; D. C. Harvey, *The French Regime in Prince Edward Island*, 1926; and J. B. Pollard, *Historical Sketch of Prince Edward Island*.

Prince Edward Island, small is., in the S. Indian Ocean, 1400 m. S.E. of S. Africa. It was annexed by the S. African Gov. in Dec. 1947, the chief purpose of the annexation being the estab. of an air base as a link in Commonwealth communications in the S. hemisphere. At the same time an Australian expedition landed on Heard Is., over 2000 m. S.S.E. of P. E. I., for a similar purpose.

Prince of Wales (title), see WALES, PRINCE OF.

Prince of Wales, Brit. battleship, see under PACIFIC CAMPAIGNS or FAR EASTERN FRONT IN SECOND WORLD WAR.

Prince of Wales Island: 1. See PENANG. 2. Is. situated in Low Archipelago of Pacific, in 15° 18' S. and 147° 23'

W. 3. Is. in the Alexander Archipelago of Alaska.

Prince of Wales's Own, see **YORKSHIRE REGIMENT, WEST.**

Prince of Wales's Theatre, theatre in Coventry Street, London. The original building, known as the Prince's Theatre, was built in 1883 and opened the following year. The opening programme consisted of two plays, Sydney Grundy's *In Honour Bound*, and W. S. Gilbert's *The Palace of Truth*, the cast including Kyrie Bellew and Herbert Beerbohm-Tree. In 1937 the old theatre was demolished, and Gracie Fields laid the foundation stone of the new building. Since 1942 productions have included *No Orchids for Miss Blandish*, *Diamond Lil*, and *Harvey*.

Prince of Wales's Volunteers (South Lancashire Regiment), formed in 1712 as the 40th Foot and served in Nova Scotia in the war of the Austrian Succession, a war which embraced three continents. The regiment's battle honours, prior to the First World War, include St. Louis, 1778, Monte Video, all the great battles of the Peninsular war, Waterloo, Kandahar, 1842, Ghazal, 1842, Kabul, 1842, Sevastopol, Lucknow, and Relief of Ladysmith. At Waterloo the 40th was in reserve, but subjected to so heavy an artillery fire that three companies were cut to pieces. In 1881, under the reorganisation scheme, the 40th and 82nd Foot were amalgamated as the 1st and 2nd battalion of the P. of W. V. In the First World War the various battalions, regular and territorial, fought in Gallipoli, Egypt, and on the W. front. In the Second World War the regiment was in Madagascar (*q.v.*). Regular and other battalions took part in the early fighting in Normandy in 1944, winning especial distinction in a charge across a riv. to the W. of Caen. See the hist. of the regiment by Lt.-Col. F. E. Whetton, 1928.

Prince Rupert, seaport in. at the W. terminus of the Grand Trunk Pacific Railway, on Kalen Is., Port Essington estuary, Brit. Columbia, Canada. Founded in 1909, it has since developed rapidly and has fisheries and fish canneries, and ships' halibut, minerals, lumber, and grain. Pop. 6700.

Prince's Theatre, theatre in Shaftesbury Avenue, London. It was opened by S. F. Melville, who had built up a reputation in pantomime production at the Lyceum, in Dec. 1911. It was intended at that time to fill the need for a large theatre for melodrama and popular drama. Among its most successful productions have been *White Cargo*, *Bills and Pieces*, *Funny Face*, *Sherard's Pie*, *Magic Carpet*, and numerous ballets.

Princes' Islands, group of nine is. in the E. of the Sea of Marmora, the two largest being Prinkipo and Khalki. They are about 13 m. S. of Constantinople, and are celebrated for their beauty and fine climate.

Princeton: 1. Bor. of Mercer co., New Jersey, U.S.A., 10 m. N.E. of Trenton. The univ. of P. owes its existence to a college founded at Elizabethtown in 1746,

and moved to P. in 1756. It was then called the College of New Jersey. In 1980 it had 2000 students; in 1948 13,200. There is also a Presbyterian seminary, founded in 1812, the Rockefeller Institute for Scientific Research, and other educational institutions. Washington defeated the Eng. here in 1777. Pop. 7700. See Hageman, *History of Princeton and its Institutions*, 1870. 2. Cap. of Gibson co., Indiana, U.S.A., 27 m. N. of Evansville. An important grain and cattle market, it has also manufs. of glass, lumber, etc. Pop. 7800.

Principal, see AGENT; GUARANTEE. Pringle, Thomas (1789-1834), Scottish poet, b. at Blaiklaw, Teviotdale, and educated at Edinburgh Univ. His *Autumnal Excursion* (1816), contributed to Hogg's *Poetic Mirror*, won him Walter Scott's friendship. With Lockhart, Wilson, and others he helped found the *Edinburgh Monthly Magazine* (1817), later *Blackwood's Magazine*, editing it for some months with J. Cleghorn. Emigrating to the Cape (1820) he formed the Glen-Lyndon settlement, and ed. the *South African Journal*. Returning to England (1826), he pub. his experiences in *Narrative of a Residence in S. Africa*, contained, with the fine poems 'The Emigrants' and 'Afar in the Desert', in his *African Sketches* (1834). His earlier poems, *Ephemerides*, appeared in 1828. See ed. with life by J. Conder, 1835, and L. Ritchie, 1838.

Pringle-Pattison, Andrew Seth (1856-1931), Scottish philosopher, b. in Edinburgh; educated in Edinburgh and Germany. He was prof. of logic, metaphysics, and rhetoric at Cardiff, 1883; at St. Andrews, 1887; at Edinburgh 1891-1919. He was Gifford lecturer at Aberdeen Univ., 1911-13, and Hilbert lecturer, 1921. He was Gifford lecturer, univ. of Edinburgh, 1921-23. His works include *The Development from Kant to Hegel* (1882); *Essays in Philosophical Criticism* (with Haldane) (1883); *Irregularism and Personality* (1887); *Scottish Philosophy* (new ed., 1890); *Two Lectures on Theism* (1897); *Man's Place in the Cosmos* (new ed., 1902); *The Philosophical Radicals and other Essays* (1907); *The Idea of God in the Light of Recent Philosophy* (1917); *The Idea of Immortality* (1922); and *Studies in the Philosophy of Religion* (1930).

Pringles, tn. of Argentina, in Buenos Aires prov., 300 m. from Buenos Aires, and 135 m. N. of Bahía Blanca. It is the centre of a thriving agric. dist. Pop. 13,000.

Printing may be described as the art of taking copies by pressure from the inked surface of engraved blocks or movable type; or from incised lines on metal plates, as in engravings and etchings; from depressions, as in photogravure, or from the smooth surface of stone so treated as to reject the ink except where required (lithography).

HISTORICAL.—Although we know that P. from movable type was practised in China in the thirteenth century and in Korea in the fourteenth, and that block

P. was in use there and in Japan some centuries earlier, yet it was not till the middle of the fifteenth century that any press was set up in Europe. In the E. from the multiplicity of the characters required, the use of type soon went out, and the Chinese reverted to block books. One hundred and forty years after movable type had been introduced in the W., it returned to China, where it had originated over 550 years before. The first book printed by Europeans in China was printed in 1590: *De missione Legatorum Japonensium ad Romanam Civitatem*. The earliest undoubted date for any European woodcut block is 1423, and although there is no certain evidence for the existence of block books with both text and illustrations out in wood before 1460, it seems most probable that the desire for some text to accompany the pictures would early lead to this method. As to who was the inventor of P. from movable type in Europe, opinions are divided, and the controversy has gone on with more or less acrimony for nearly four hundred years whether Johann Gutenberg (q.v.) of Mainz should have the honour or Lauronz Janszoon, surnamed Coster (q.v.), of Haarlem. Neither, it appears on any P. turned out at their respective presses, nor do any of the associates of either mention him as a printer or the inventor of P. In the *Cologne Chronicle*, 1499, it is said, on the authority of Ulrich Zel, a printer of Cologne, that 'this right worthy art was invented first of all in Germany at Mainz on the Rhine,' and proceeds: 'This happened in the year of our Lord 1440, and from that time on until 1450 the art and what belongs to it was being investigated, and in the year of our Lord 1450 . . . men began to print, and the first book that was printed was the Bible in Latin [the Lat. Mazarin Bible].'

'Although the art was invented at Mainz as regards the manner in which it is now commonly used, yet the first prefiguration was invented in Holland from the *Donatuses* which were printed there before that time.' The chronicler continues: 'The first inventor of printing was a burgher of Mainz, and was born at Strasburg, and called Yunker Johann Gutenberg.' Junius Hadrianus in his *Balania*, printed in 1588, states of Lauronz Coster of Haarlem, that in 1440 he first cut letters from the bark of trees and printed them for the amusement of children, and afterwards used lead and tin, that a workman in his employ stole the letters and went to Mainz, and in 1441 set up a press there, and in 1442 printed the *Doctrinale* of A. Gallus and the *Tractatus* of Hispanus. From these two sources the controversy arose, and there is a considerable literature on the subject, notably A. van der Linde's *The Ooster Legend* (1871), Gutenberg (1878), and *Geschichte der Erfindung der Buchdruckerkunst* (1882); and Heesels's *Gutenberg: was he the inventor of Printing?* (1882), and *Haarlem the Birthplace of Printing, not Mainz* (1887). The controversy continues, but the greatest weight of evidence at present is for Gutenberg as being the first in Europe to make a practi-

cal business of P. from movable types. A form of P. press was already known, so was the necessary stiff ink; paper was available, so that Gutenberg's contribution was largely in devising a practical method of casting large numbers of identical types in a reasonable length of time. No date or name of printer appeared on any book until 1457, when the names of Furt and Schoeffer, who had been associated with Gutenberg, appeared on the famous and beautiful *Psalter*. This magnificent vol. has initials printed in red and blue, and the craftsmanship is of a very high standard.

Cologne had some noted printers, and here the title-page was first used and leaves began to be numbered and the 'signature' added to the first page of the sheets. Here, too, Caxton made his first acquaintance with the press from some printer whose name has not come down to us. Printed musical notes appeared in 1473 in Gerson's *Collectorium*. In Italy the first printers were two Gers., Sweynheym and Pannartz, who in 1461 started a press in Subiaco; before the end of the fifteenth century there were thirty Ger. printers there out of a total of forty; at Venice, too, the name occurs of John of Speler in 1469. Naples and Milan, Florence and Ferrara all had presses before 1500. It was Italy that first broke away from the Gothic form of letter that had been used by the Ger and Dutch printers. One of the finest printers was Nicolas Jenson whose noble roman type was the inspiration of Wm. Morris's 'Golden' type, of the 'Doves Press' type, and of Bruce Rogers's 'Centaur' type. Venice produced in the fifteenth century nearly half of the books printed in Italy, and Italy with its many presses had a larger output by far than Germany, and produced finer work. The first printers in France, too, were Ger. craftsmen, Friberger, Goring, and Crantz, who were brought to Paris in 1470 for the press at the Sorbonne, and in 1473 started their own press. In 1499 Aldus Manutius produced the *Dream of Polyphilus*, regarded by many authorities as one of the finest illustrated books ever produced. The types used by Aldus were excellent and a revival of one of them, now called 'Bembo,' is one of the best types for books in use to-day. Aldus was the first printer to use sloping or what is now known as italic type. In the Netherlands, Utrecht, and Alost produced the earliest dated work which we know, and that as late as 1473.

The first Eng. printed book to bear a date was the *Dices or Sayings of the Philosophers* issued by Wm. Caxton from his press at Westminster, Nov. 18, 1477, although, as he had been settled there for over a year, it is probable that it was not the first work printed there. During his first three years at Westminster Caxton printed forty books, and in the fifteen years of his life that the press was carried on by him no fewer than 100, including new eds. His first use of signatures and of spaced-out lines was in 1479, and of woodcut blocks in 1481. At Caxton's death in 1491 the business

came into the hands of Wynkyn de Worde (q.v.), who had been his foreman, and was carried on at Westminster till 1500, when he removed to Fleet Street, during which time almost all his dated books were reprints of those issued by Caxton. In all, his output during this period was no less than 100 vols. Oxford was not long behind Westminster in starting P.; there is a book supposed to be from the press of Theodoric Rood which bears date 1468, but this date is an error for 1478, caused by the dropping out of an X. In 1480 another printer, John Lettoun, set up a press in London, and was joined a few years later by Wm. de Machlinia, who continued the business by himself at two addresses—'By Flete-bridge' and in Holborn. There is no direct record of the fact, but very strong evidence in support of the belief, that the business of Machlinia was taken over by Richard Pynson, who was the finest printer in England before the end of the fifteenth century, his first dated book being issued in 1492. The only other London printers of this period to be mentioned are Julian Notary and Jean Barbier, who were working together from 1498 to 1500. The term *Incunabula* (q.v.) is applied to books which were printed before 1500.

From 1500 onwards it must suffice to mention a few of the printers who have done most for the advancement of the craft (see separate articles). Aldus has already been named, and after him Johann Froben of Basle (d. 1527) may be mentioned for the decorations and literary quality of his output. Paris now comes to the front with Henri Estienne, and later his son Robert, Simon Colines, and Geoffroi Tory. In Lyons there were Etienne Dolet (commenced P. 1538), Sebastian Gryphius (commenced P. 1528), and Jean de Tournes (1504-64). In Antwerp from 1570 onwards Christopher Plantin was turning out a vast quantity of books, some of them most costly productions, such as his Polyglot Bible (1569-73). Very little can be said for the quality of Eng. P. in the sixteenth century, though in 1559 the work from the press of John Day entitled him to be classed amongst the fine printers. Scotland had its first press in Edinburgh, and in 1507 James IV. licensed Walter Chepman and Andrew Myllar to print; and the first printer in Ireland of whom there is any reliable account was Humphrey Powell, who was printing in Holborn in 1548-49, and set up in Dublin in 1550. At Oxford, where there had been no press at work since about 1476, Walter Burley was printing in 1517, and his latest book is dated 1519, and no other printer is known there for seventy years. The earliest Cambridge date is 1521 on a book printed by John Siberch (a trans. of Lucian), it is sixty years before another Cambridge imprint is found. There were printers in Tavistock in 1525; in Bristol, 1546; Ipswich, 1547; Canterbury, 1549; Norwich, 1566; and in addition to this there were sev. secret presses in various parts of the country. The seventeenth

century was a period of stagnation, if not retrogression, in the quality of P. both on the Continent and in England especially. The large family of the Elzevirs in various tns. in Holland stand out prominently, however; their business was founded by Louis in 1583, and the latest printer of the name was Abraham, who died in 1712; the most famous of the Elzevirs was Bonaventura, who commenced P. in 1608 and died in 1652. The books bearing their imprint number over 1600 (see ELZEVIUS). In England during this period the name of Robert Barker should be mentioned as the printer of the so-called authorised version of the Bible, 1611, and those of Wm. and Isaac Jaggard



A PRINTING PRESS: SEVENTEENTH CENTURY
An illustration from a page of *Spiegel van het menschelyk bedryf*, by Jan and Caspar Luiken, Amsterdam, 1694.

for the folio Shakespeare of 1623. Richard Norton in 1610 issued a very fine ed. of the works of St. Chrysostom. The first press in the Amer. colonies was at Harvard College, Cambridge, the Rev. Joseph Glover having given to the college a fount of type. This remained the only press till 1680, when another press and another printer, Marmaduke Johnson, were sent out from England to print a Bible in the Indian tongue, upon which book the two printers worked together, and completed it in 1683. Boston was the next to have a press, in 1675, and the colony of Pennsylvania followed in 1685, but presses set up in Virginia in 1682 and in Maryland in 1689 were at once suppressed. P. in New York began in 1693. Up to the end of this century the Eng. printers had been their own typefounders in most cases, though sometimes procuring matrices and sometimes type from the Dutch. Dr. Fell, at the Oxford Univ. Press, estab. a type foundry in 1667 and helped to produce some of the finest P. in England.

Fell types have been revived for occasional books in this century, notably for the Nonesuch Press.

Wm. Caslon, the greatest of Eng. typefounders of the eighteenth century, cut some beautiful types in 1718, and it is probable that the type used by John Baskett (the royal printer at Oxford) in the Bible of that date, commonly known as the 'Vinegar' Bible, was from his foundry. Other printers in London in the eighteenth century were Samuel Richardson (*q.v.*), the novelist and bookseller, who started in 1706; Henry Woodfall and Thomas Bensley, who commenced business in 1783. After 1744 Robert and Andrew Foulis of Glasgow issued some beautiful books, and John Baskerville (*q.v.*)—a writing master of Birmingham—who became univ. printer at Cambridge (1760–70) is recognised as the finest typographer of his time (he began printing in 1750) in this country at least. A revival of his type is in regular use by book printers to-day. On the Continent the two outstanding names are those of the Didots (*q.v.*) of Paris and Giovanni Battista Bodoni (*q.v.*) of Parma. There were a number of private presses started in England in the eighteenth century, the most prominent among them being that of Horace Walpole at Strawberry Hill. The prin. features to be recorded of P. in the nineteenth century are the substitution of iron for wood in the P. press, and, in common with other manufs., the introduction of machinery and steam and other power and of type-setting machines; these, however, are treated of in the technical portion of this article. Of the printers, Bulmer, Bensley, and John Nichols were all three producing important works. The line of the king's printers was continued from 1770 by the ancestors of the Eyres of Eyre & Spottiswoode. Edmund Evans was the printer of Kate Greenaway's famous children's books, and also the work of Randolph Caldecott, both of which owe much to the printer for the beauty of their illustrations.

Improvements in decoration and in display of title-pages is associated with the work of Ch. Whittingham the younger, and of the new designs of types and decorated pages produced by Wm. Morris (*q.v.*) at the Kelmscott Press, and his influence upon others of the private presses for which beautiful types have been designed. Notable among these is the Doves Press whose austere typography was in such contrast to Wm. Morris's decorative exuberance. After the First World War many fine private presses had an influence on general publishing and book printing, conspicuously the Golden Cockerell Press under Robert Gibbings, who employed Eric Gill to design types and illustrations. The Nonesuch Press (*q.v.*), founded by Francis Meynell, proved that elegant and beautiful books could be produced on modern machines in modern types at moderate prices. Previously, the private presses had used hand presses and the prices were out of reach of all but the rich. Some of the loving care, the good taste, the inventiveness that used

to be lavished on collectors pieces is now going into everyday productions though more often by the publisher's initiative than by the printer's.

PRACTICAL WORK.—**Typography**, or P. from a raised surface, is by far the most used of the three methods specified in the definition of P. and includes not only P. from movable type, but all relief P., *e.g.* stereotypes (*q.v.*), or type-metal casts produced from moulds of plaster or slong of whole pages of type or other matter; electrotypes, or copper shells backed with metal, produced from electrical deposit upon moulds of plastic or wax taken from type, woodcuts, line or half-tone blocks; or directly from any one of these three kinds of blocks. Typefounding is described under TYPE and TYPEFOUNDING; electrotyping under METALLURGY; line and half-tone blocks under PROCESS WORK; and woodcuts under WOOD ENGRAVING.

COMPOSITION.—Composition by hand only is here considered, that by machine is treated in a separate article—**TYPE-CASTING AND TYPE-SETTING MACHINES**. In practice, only small jobbing work is hand-set to-day. All continuous reading matter of any length is always set on a machine which may cast types singly ('Monotype') or in lines ('Linotype', 'Intertype'). Experiments are being made with photographic type-setting machines for use with the photographic reproduction processes. Each character must, of course, have its own place, and for this purpose each font needs two cases, or trays, divided by partitions into separate boxes, one for each character. These cases lie on the top of the composing frame at about breast height, sloping upwards towards the back. These are the cases for immediate use, and beneath there is a rack to hold five pairs of cases. The upper case contains all the capitals, small capitals, figures, and accented letters. The lower case, because of the varying frequency of occurrence of the different letters, and the greater aggregate of them used, has boxes of varying size. (From this arrangement are derived two phrases in the printer's terminology: 'Upper case' refers to capitals, and 'lower case' to small letters.) There are four different sizes: the largest, of which there is only one, is for e, which is six times the size of the boxes in the upper case; then there are fourteen two-thirds its size, eleven one-third, and twenty-six one-sixth. This case contains all the small letters excepting accented ones, and the punctuation marks, quadrats, and spaces, double letters like ff, fl, and &, and the boxes are so arranged that the larger and more frequently used ones are together in the middle of the case. Type is set by a compositor who takes each letter and space in turn out of its box and places it in a small adjustable tray, known as a composing stick. The ordinary stick used in book and jobbing work is of metal, with the left end adjustable by a screw or spring fastening, so that the measures may be altered to the length of line to be set. In beginning a paragraph an em quadrat,

or space the size of the letter M, is first placed in the stick to the extreme left and held by the thumb to form the indentation, then the types, letter by letter, of the first word are taken from their boxes and placed in the stick as they are picked up. As each word is set a space is put in (except, of course, at the end of a line), generally a thick or three to em, and when the last word that the line will hold has been set, if that does not fill out the line and the next word cannot be divided, the line will require justification, that is, the space between the words altered to accommodate the word in question. If the work is not to be set solid, that is, each line of type close up to the one above it, a thin strip of lead is inserted between the lines. In emptying the stick the compositor uses a lead which was placed in the stick before the first line was set, and, turning the stick end for end so that the last line set is nearest to him and the setting-rule outside that, grasps the ends of the matter between the lead and rule with first fingers and thumbs of his two hands and steadies the type at the sides and back with his other fingers, and so carries it to the galley, which is a flat tray with three raised sides made sometimes of wood, but mostly of metal; in this and on a special press a galley proof is generally pulled for first reading. In the case of long books or books which have special problems of layout or are likely to be heavily corrected, the editor, author, or publisher may require to see proofs at this stage (for marking of proofs see *PROOF-READING*).

The type, corrected, is now made up in page form, with headlines and page numbers added. When the number of pages that will complete one sheet are ready they need to be imposed, or arranged in such relation to one another that when printed the sheets may fold with the pages appearing in their correct order. This having been done, the whole requires the insertion of furniture (wooden or metal strips) between and around the pages and to form the margins. It is then locked up in a chase or iron frame with bars across it to give security to the forme, as the chase with the assembled pages is called. When the furniture is in position the type is held firm inside the chase by means of wedges known as quoins. Before the quoins are tightened the planer is used to ensure for the type an even surface, which it would not have if some letters were not standing on their feet but sticking to the next letters. The planer is a block of wood about 1 in. thick, and about 6 in. by 8 in., which is placed on the face of the type and gently struck with a mallet. A first page proof is now pulled and the corrections made. After printing, the type may be returned to the composing room for distribution, i.e. return to the cases, if it is desired to preserve it.

The practice of bookwork applies also to jobbing and news work, and where there is any difference it will now be mentioned. The term 'jobbing work' is applied chiefly to cards, circulars, invoices, hand-

bills, and other small work, as well as to posters, and to a very large extent consists of displayed work. The differences between the operations of the newspaper office and those which have been described are that a much larger proportion of the composition is done by mechanical means (see *TYPE-CASTING AND TYPE-SETTING MACHINES*), and there is very little distribution in that, the type being melted down and the metal used again; and the fact that when the ordinary movable type is used it is not printed from direct, but stereotyped plates are made, either flat or, more frequently, cast in semicircular form, for attachment to the type cylinders of rotary presses (see *STEREOTYPING*).

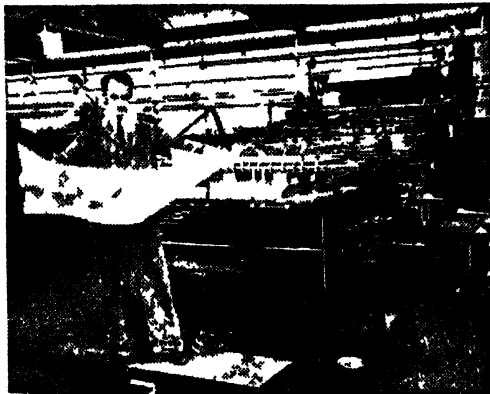
PRESS AND MACHINE WORK.—For the best part of 400 years after the invention of P. in Europe the same style of wooden press was in use, with only minor improvements, and these chiefly in Holland. It was a screw press, made entirely of wood, except that the bed upon which the forme lay was of stone, contained in the carriage or 'coffin.' It was only in the first decade of the nineteenth century that the first iron press was invented by Earl Stanhope; in this the chief improvement, beyond the fact of its being of iron and therefore more rigid and less clumsy, was the use of levers in place of the screw. The same structural form, however, still persists, which may be described as a vertical frame, standing on four feet and supporting a platen made to rise and fall at will by the use of a horizontal bar. Horizontal runners or ribs are fixed to the bottom of this frame, supported at the other end by one leg, with a carriage travelling upon them, forming the bed of the press, and bearing upon it the forme, which is drawn out for inking, and placing the sheet and returned beneath the platen to receive the impression. The movement of the carriage is effected by a winch arrangement. The platen, which is supported on a strong spring contained in a box at the head of the press, is forced down by a piece of steel, called a chill, being brought to a vertical from a sloping position by means of a lever actuated by the pulling over of the handle bar, the recoil of the spring carrying back the platen to its former position on the return of the handle bar. Two adjuncts of the press have yet to be described: the tympan and frisket. The former is fixed with detachable hinges to the carriage at the end farthest from the platen when the carriage is run out, and consists of two iron frames each covered with parchment stretched tightly, one being made to fit within the other, so that they are flush in thickness, the larger one being of the same size as the bed of the press. The two frames are fastened together by hooks on the larger one, with studs on the smaller, and the parchment on both is on the lower side, between which a few sheets of paper are interposed for the purpose of equalizing and taking off the hardness of the impression. When the tympan is fixed to the carriage as described and turned upon its hinges, it is

upon the inner side that the paper to be printed is laid. The frisket serves to hold the paper in its place when the tympan is lowered on to the forme, and to prevent any ink that may have got on to the furniture or chase from reaching the paper, it consists of an iron frame slightly smaller than the outer frame of the tympan, to which it is attached in the same way as that is to the carriage. A sheet of strong paper is pasted on to the frisket in the same way as the parchment is to the tympan and this paper is cut away in those places where it would fall upon the type a framework of paper being thus left to support and protect the margins of the sheet to be printed

making the impression equal for the whole forme, and this is effected for the most part by varying the number of thicknesses of paper within the tympan. The basic reason for inequality of impression in type is (a) inequality of surface of the bed of the printing machine and (b) the variation in pressure received by characters with a printing surface which is small (e.g. a full point) and those with a large surface (e.g. the letter *m*). The Letouzey method of printing reduces make ready by employing type cast with minute differences in height, e.g. *m* has a shorter shank than the full point. Overlaying applies to woodcuts, line, or tone blocks, and is on the same principle as making



THE COMPOSITOR AND THE
PRINTER



Left The compositor is preparing a small form for jobbing work. Right The printer is examining the first sheet (Quad Demy) run from a flat bed machine after completion of make ready

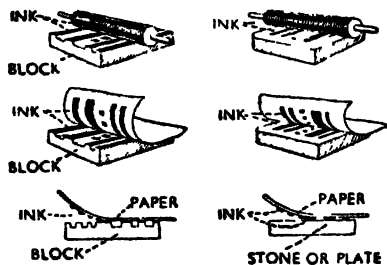
Ink tables are mostly made of iron and fixed to the floor. They are of two sorts: one has a cylinder with crank handle to give out the ink from a receptacle behind it, with the other a brayer, a wooden implement in the form of a short broad cylinder with an upright handle at the top is used to rub out the ink as needed. Inking balls with a handle at the top were used in the old days for beating the ink upon the type but at the present day rollers are used. They are made of a composition which includes glue and tallow and are cast or moulded around a wooden spindle and revolve in an iron frame with upright handles or a single handle in the case of short ones. (For ink see under **INK**) Nowadays these hand presses are only used for making proofs, but in the past two men generally worked together at a press, one rolling and one pulling, and about 250 impressions in the hour was the usual speed. This is after making ready, and overlaying, which are processes that have to be described here, though the same operations occur with machine **P**. Making ready, on both press and machine, is bringing up the type to an absolute level, or more accurately,

ready a type forme, but is much finer work and its object is the reverse, namely to give a heavier impression on some parts of the block than on others. Half tone blocks do not require the same amount of overlaying as woodcuts as a finer gradation of tone is natural to them nor must the overlays be so thick or so hard a paper.

The smaller platen machines are sometimes worked by treadle, the larger machines either platen, cylinder or rotary are power driven. It is intended here to give a general idea of the principles on which they are constructed. **P** machines may be divided into three classes: platen machines in which both the **P** surface and the impression surface is flat, cylinder machines in which the **P** surface is flat and the impression surface cylindrical, and rotary in which both surfaces are cylindrical. The principle of the smaller platen machines is as follows: they have a vertical coffin facing the operator, upon which the forme is fixed by clamps on a special chase. The platen, when the sheet is laid on, is nearly horizontal and immediately in front of the operator, being supported by

two arms, by which in working it is carried down to face the forme; its position whilst travelling gradually assumes the vertical, and on arriving at this position the impression takes place. The impression is regulated by one or more screws, or, in some makes, wedges, at the back of the platen. As the platen returns to position for laying on after each impression, the inking rollers travel downwards across the inking table and over the forme, returning as the platen again approaches the forme. The making ready is upon the same principle as in the hand-press; and this holds good with machines of the various sorts. With the class of machine above described a lad can lay on and take off 1000 per hour with a treadle machine, or more with power.

The first P. machine was a cylinder machine invented by Wm. Nicholson in



THE PRINCIPLE OF LETTERPRESS OR RELIEF PRINTING (left) COMPARED WITH LITHOGRAPHIC (SURFACE OR PLANOGRAPHIC) PRINTING (right)

A block is shown for the purpose of illustration: the principle applies equally to a line of type.

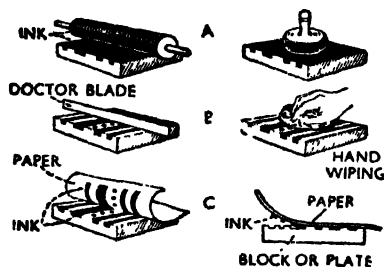
1790, and about twenty years later this was improved upon by Koenig for *The Times*. Cylinder machines may be classified as follows: flat-bed machines and rotary. Of the flat-bed machines the simplest form is that with one cylinder, which prints only one side of the paper. In this form the cylinder is placed across the machine about midway of its length, with the ink duct and ink-distributing arrangement at one end, and the inking rollers, between these and the cylinder and close to the latter, the other end being occupied by the laying-on board. Beneath the whole of this the bed travels with the inking table attached, so that at the time the ink table is receiving the ink from the distributor the forme has just passed under the inking rollers, the grippers on the cylinder have opened to release the sheet just printed, and a fresh sheet has been laid in; on the return journey the type again passes under the rollers, followed by the table supplying fresh ink to the rollers, and the cylinder has revolved with the paper around it over the type. Of this class of machine there are two main types; the stop-cylinder, in which the cylinder remains stationary when the

impression is not being made; and the two-revolution, in which the cylinder always rotates; of which again there are two types—one makes a second revolution in the same direction during the return of the forme-carriage; the other, which is a two-feeder, has inking arrangements at each end, and the cylinder, instead of continuing to revolve in one direction, reverses with the reversal of the direction in which the forme carriage is travelling.

Two-colour machines are mostly of the flat-bed kind, but in their case there are two formes—one colour at one end, and one at the other. As this carries the same sheet for the two revolutions it is only a single feeder. The two-cylinder machines print both sides of the sheet at separate impressions before delivering it, and so are called 'perfecting' machines. They also have an inking arrangement at each end, besides the two formes. Like the two-revolution single-cylinder machines, they are fed from above the cylinder and not below as with the stop-cylinder. In a certain type the sheet when fed in is carried by tapes around the first cylinder, where it receives the first impression; thence it is carried around two smaller drums placed between the two cylinders and on a higher level which leads it to the second cylinder, reversed for receiving the second impression. In another and more modern type the sheet is fed into grippers, and transferred direct to grippers on the second cylinder. All these machines are fitted with automatic arrangements for delivery, which vary with various makes, and all can be fitted with automatic machinery for feeding the sheets. By means of a circular knife the sheet may be delivered cut into two for convenience in the folding operation to follow (see BOOKBINDING). In two main respects rotary machines are entirely different from other P. machines. In the first place, besides impression cylinders they have type cylinders, which is somewhat of a misnomer, as it would hardly be practicable to lock up type in a cylindrical forme, so that they use stereotype plates in place of type. The type is set most often by machinery and locked up in the ordinary way, then a mould is taken in long (see L'APRÈS); this can easily be bent for casting from, so that it will fit on to the cylinder. The other difference is in the paper, which is fed in from reels instead of separate sheets, though some rotary machines are adaptable on occasion for single-sheet feeding. These are all-perfecting machines, and are chiefly in use in newspaper offices. They not only print on both sides of the paper, but cut, fold, and when required, paste and deliver in bundles of a predetermined number. Many magazines, whether illustrated or not, are printed on rotary machines, being folded, the sections inserted in the correct sequence, and wire stitched, in some cases into a wrapper, printed in one or two colours (see also PHOTOGRAPHY).

Intaglio and Photographic Processes.—The making of engraved or intaglio plates (see ENGRAVING) having been described

under the headings given above, it remains to describe the P. processes and machinery used for this and for flat-surface (planographic) P., as in lithography. The method employed in the P. of intaglio plates of all sorts is to dab the ink well into all the work on the plate, then to wipe the surface with a rag, and to polish it with the ball of the thumb. The paper is placed on the face of the plate on the table of the press and covered with a blanket, and the table drawn through between the two iron rollers. The P. of coloured engravings by this method is necessarily a slow one, as all the colours have to be, as it were, painted on to the plate for every copy printed, although attempts have been made to print each colour from a separate plate. Besides the ordinary copper-plate press mentioned above there are machines, both flat-bed and rotary, which work at far greater



THE PRINCIPLE OF INTAGLIO PRINTING

A, plate inked all over; B, ink wiped off surface; C, print.

speed, and with which the inking, wiping, and P. are all done mechanically (see also PHOTOGRAPHURE). In some of the rotary machines the ink is scraped from the surface of the plate by a 'doctor' blade instead of being wiped off; in all cases, however, the ink has to be worked into the incised lines of the plate and the face of the plate cleaned before each fresh copy is printed (see further under PHOTOGRAPHURE). Lithography is the process of drawing upon and P. from stone. The principles upon which the process is based are the antagonism of grease and water, the disposition of greasy substances to adhere to one another, and the property of absorption possessed by calcareous stones. A chemically pure surface is covered in the portions it is intended to print with a greasy composition (i.e. has a drawing, etc., made on it), and the rest of the surface is moistened, so that the application of a greasy roller causes the resistance of the wet portion, but not of the greasy part, and an impression can readily be taken from the surface when treated in this manner. This process can also be carried out mechanically, zinc plates with a grained or roughened surface taking the place of the stone. These can be buckled round the cylinder of a litho printing press. Collotype (q.v.) is allied to

lithography. Offset P. is the latest development of planographic P. In this process the P. surface is rubber, either a flat sheet or mounted on a cylinder. Upon this an impression is taken from a litho stone, from type, or from an engraved plate in a lithographic ink, so that work produced by any of these classes may be printed by transferring the ink to the rubber, and thence to the paper. Offset P. and the basic parent process is described in detail in the article LITHOGRAPHY.

Correction of Proofs. See PROOF READER; PROOF-READING.

See also CALICO PRINTING; COLOUR PRINTING; ILLUSTRATION; INCUNABULA; LITHOGRAPHS; PHOTOGRAPHURE; PROCESS-WORK; STEREOTYPING; TYPE-CASTING AND TYPE-SETTING MACHINES; TYPOGRAPHY.

See E. C. Bignmore and G. L. H. Wyman, *A Bibliography of Printing, with Notes and Illustrations*, 1880-86; T. Jacob, *Printing* (5th ed. 1910); T. L. de Vinne, *The Practice of Typography*, 1914; S. Morison and N. Jackson, *A Brief Survey of Printing*, 1923; S. Morison, *The Art of the Printer*, 1925, *Type Designs of Past and Present*, 1926, and *The Typographic Arts*, 1949; G. Winship, *Gutenberg to Plantin* (an outline of the early history of Printing, 1450-1600), 1926; O. Simon and J. Rodenberg, *Printing of To-day*, 1928; A. F. Johnson, *Type Designs*, 1934; D. B. Updike, *Printing Types*, 1937; H. Jackson, *The Printing of Books*, 1938; E. Gill, *Essay on Typography*, 1940; P. Simpson, *Proof-reading in the XVIIth, XVIIIth, and XIXth Centuries*, 1948; F. Meynell, *English Printed Books*, 1948; H. Curwen and J. Brough, *What is Printing?*, 1948; H. G. Aldis, *The Printed Book*, 1949; J. W. Forsyth, *Organisation and Management for Master Printers*, 1949; J. R. Biggs, *An Approach to Type*, 1949; K. Ullyet, *Pictorial Printing Processes*, 1949; and the periodicals *Typography*, *Signature*, *Monotype Recorder*, *Alphabet and Image*, and *British Printer*.

Printing Ink, see INK.

Priority, preference in obtaining labour or materials in short supply. The word acquired this special application during the Second World War and the system of P. put into operation depended its effectiveness on the setting up of controls. The P. Div. of the Board of Trade was formed to deal with the business of obtaining labour, fuel, materials, and capacity for civilian productions (home and export) and to allocate, by arrangement with the Controls, certain raw materials for those purposes, notably steel and timber. In relation to the rationing system commodities for which P. are laid down include petrol, milk, bananas, etc., among those given P. being doctors (petrol) and young children (milk, bananas).

In its legal use the word has sev. applications, e.g. as among creditors against a debtor or insolvent where the estate of the debtor is insufficient to meet all claims (see COMPANY AND COMPANY LAW; *Winding up*; DEBT).

Prior, Matthew (1684–1721), Eng. poet and diplomatist, b. of an artisan family at Wimborne Minster, Dorset. He attracted the attention of the earl of Dorset, and was educated at Westminster School and St. John's College, Cambridge, of which he became a fellow in 1688. Through the influence of the earl P. was appointed in 1690 secretary to Lord Dursley (later earl of Berkeley), Eng. ambas. at The Hague; he acted in the negotiations for the treaty of Ryswick (1697), and was under-secretary of state in England (1689). In 1700 he entered Parliament as a Whig, but joined the Tories in 1701. He was commissioner of customs from 1711 to 1714, and ambas. at Paris in 1713, and was imprisoned by the Whigs (1715–17) on their return to power. After his release he lived in retirement on the proceeds of his writing and with the help of friends, in particular Lord Harley. His poetry is contained in the various eds. of his *Poems on Several Occasions* (the chief collection being that of 1719). His attempt to write Pindaric odes, as illustrated by his *Carmen Seculare* (1700), a panegyric on William III., met with no real success, and his odes in bulk are not usually reckoned among his best efforts. *The Hind and the Panther Transferred to the Story of the Country Mouse and the City Mouse*, written in 1687 in collaboration with his friend Charles Montagu, is a travesty of Dryden's *Hind and the Panther*. *Alma*, written in prison in imitation of Butler's *Hudibras*, is a humorous speculative poem on the relations of body and soul. P. is, however, remembered less for these and similar works, such as *Solomon* (1718), *Henry and Emma* (c. 1701), and *English Ballad on the Taking of Namur* (1695), than for light occasional verse in the vein of Herrick. There is sincerity and wit in many of his short poems, such as *The Lady's Looking-glass*, *On my Birthday*, *For my own Monument*, *The Question to Lisetta*, *A Song*, *Hans Carvel*, *To a Child of Quality*, *The Secretary*, and *Jenny the Just* (first given to the world in A. R. Waller's ed. of the *Poems*, 1905–7). Mostly these are pieces of ironical or sensual badinage, depending for effect on wit and the exact suitability of form. His *Two Imitations of Chaucer* show that he has some of his predecessor's sly humour, and his two epistles *To Fleetwood Shepherd* are cleverly and wittily phrased. His tales are of a Restoration coarseness, but in their author 'we at last reach an English poet who can manage the mechanism of a conte as well as the most skilful Frenchman' (Gosse). His epigrams are particularly fine. See A. Dobson's ed. (Parchment Library), 1889, and R. B. Johnson's ed. (Aldine Poets), 1892. See also W. M. Thackeray, *English Humourists*, 1853; A. Dobson, *Eighteenth Century Vignettes* (3rd series), 1896; life by F. Bickley, 1914; and studies by C. W. Legg, 1921, and C. K. Eves, 1940.

Priory, community of monks or nuns, governed by a prior or prioress. The introduction of Ps. dates from about the end of the thirteenth century, and in many cases they are still dependent upon abbeys, to which they are finally

responsible. In other cases they are quite independent.

Pripet, Pripyat, or Prypey, riv. of the S. of the Byelorussian S.S.R., an important trib. of the Dnieper, joining it after a N. and E. course of 486 m., 43 m. above Kiev. Navigable as far as Pinsk. It traverses a marshy region, much of which has been drained and reclaimed by the Russian Gov. Its trib., the Yatsolda (Yasolda), is connected by the Oginiski Canal with the Nemen (Memel). During the First World War, the area about Pinsk, noted for its marshes, formed a great obstacle to movement and the Russian line was divided at this point. In the autumn of 1915 an Austro-Ger. offensive under Mackensen drove the Russians from this area owing to the fact that the time chosen for the offensive was the driest of the year—Aug. In June 1916 the marshes were again contested by the Russians under Brusilov, who drove out the Austrians. It was the scene of much fighting in the Second World War in 1941 and 1944. See further under EASTERN FRONT OF RUSSO-GERMAN CAMPAIGNS, in SECOND WORLD WAR.

Prism, solid figure whose sections across the longitudinal axis at any point when parallel give the same figure. The shape of the figure gives the name to the P.: triangular, rectangular, etc. The lines joining the vertical of two such sections determine the bounding planes. Its volume is found by multiplying the vertical height by the area of the base.

Prismatic Sulphur, monoclinic crystalline form of sulphur obtained by melting the ordinary form and allowing the liquid to crystallise. It is unstable at ordinary temps. and soon changes back to the common variety.

Prisoners of War. A prisoner of war may be defined as a public enemy armed or attached to the hostile army for active aid who has fallen into the hands of the captor whether by individual surrender or capitulation. In ancient times P. of W. could be and were killed, unless the belligerents found it more profitable to exchange them or liberate them for ransom. For long, indeed, there were no generally accepted rules regulating the position and fate of P. of W., and it is only within comparatively recent years that definite regulations have been established. The existing law on the subject is based on Convention IV. of the Hague Conference of 1907, which conference adopted, with certain changes, the rules made by the Hague Conference of 1864, and the articles relating to P. of W. contained in the Geneva Convention of 1906. This was somewhat extended in the Geneva Convention of 1920, when delegates of forty-seven nations met at Geneva and ratified a further agreement on the treatment of P. of W. There was further revision in 1949. Under the existing regulations, P. of W. must be humanely treated, protected from violence, and subject to no reprisals. They must be supplied with reasonable nourishment, medical and sanitary facilities must be provided, and the P. of W. are regarded as being in the power not of their actual

captors, but in that of the gov. of the captor. All their personal belongings remain their own, with the exception of arms, horses, and military papers (these constituting booty, q.r.). They may be detained in a fortress, camp, etc., or anywhere else except a convict prison, and may be kept within fixed boundaries. One of the prin. changes made in 1907 was in regard to forced labour. The state may utilise the labour of P. of W. other than officers, but it was only in 1907 that it was decided to exclude officers, though the Jap. had previously abstained from imposing forced labour on Russian officers in 1904-5. But in proper cases, those who are put to work must be paid according to rank and ability. Their tasks must, however, not be excessive and must not relate to military operations. Officers are paid the same as those of equivalent rank in the forces of the power capturing them. It is the duty of officers to make all reasonable attempts to escape, provided they have not given parole, but they may be punished if recaptured. Every prisoner of war, if questioned, must declare his true name and rank or render himself liable to the loss of the advantages given to P. of W. of his class, but he need not give any other information. The exchange of prisoners is effected in accordance with agreements called *cartels*, in which the time, place, and method of exchange are fully detailed. The basis of exchange is generally that of strict equivalents, man for man, rank for rank, disability for disability. Certain non-combatants, such as doctors, medical orderlies, and padres, may claim repatriation. A parole is a promise, either verbal or written, given by an officer to secure greater freedom of movement or to obtain special privileges or advantages while held as a prisoner of war. The officer giving the parole pledges his honour to pursue or refrain from pursuing a particular course of conduct, and a breach of this guarantee of good faith may involve the extreme penalty if the paroled prisoner be captured in arms before he has been regularly exchanged. The Convention of 1929 also allowed for information bureaux in the belligerent countries to circulate information about P. of W. During the war, a neutral power should safeguard P. of W.'s interests: the representatives of this power may visit P. of W. camps and question prisoners. The rules outlined above have no application to captured spies. The allegations made against Germany for her treatment of Brit. P. of W. during the First World War were widely pub., and undoubtedly the conditions under which the prisoners lived were not entirely unavoidable or excusable. But Germany, also, brought charges against other allied powers in regard to Ger. P. of W., and though Great Britain observed The Hague regulations, the observance of those regulations by some of the belligerents left much to be desired (see R. F. Roxburgh, *The Prisoners of War Information Bureau in London*, 1915, in regard to the working of that bureau during the First World War).

The judgment in the Nuremberg trial (q.v.) showed that in the Second World War the political and military heads of the Ger. Gov. and Wehrmacht and their subordinates subjected P. of W. to extremely bad treatment on a number of occasions. These included the shooting of fifty R.A.F. officers in March 1944. These men had escaped from the P. of W. camp at Sagan, near Breslau (Wrocław) and were shot on recapture, on the direct orders of Hitler. It was not even contended by the defendants in the Nuremberg trial that this was other than murder, in complete violation of international law. With certain notable exceptions, however, Germany on the whole observed the Geneva Convention with Brit. P. of W.; but Fr. prisoners were often ill-treated and Polish and Russian P. of W. were subjected to extreme brutality, some Soviet P. of W. being made the subject of medical experiments of the most cruel kind. Japan broke all conventions, employing P. of W. as unpaid coolie labour and using torture to extract information or as the punishment for trivial offences. Japan was one of the non-signatories of the Geneva Convention, as was the Soviet Union; and Soviet treatment of Finnish, Polish, and Ger. P. of W. during the Second World War has been harshly criticised as inhuman and lacking moral justification. In 1945 the Nobel peace prize was awarded to the International Red Cross Committee for its work done on behalf of P. of W. of all nationalities during the Second World War. In 1946 and 1947 sev. meetings were held at Geneva, organised by the International Red Cross, to consider revision of the clauses of the 1929 convention which affected P. of W. A new Geneva Convention was signed in 1949 (see further under RED CROSS). See P. des Gouttes, *Commentaire de la Convention de Genève du 27 juillet 1929*, 1930; F. W. Heinemann, *Das Kriegsgefangenenrecht in Landkrieg*, 1931; W. S. Flory, *Prisoners of War*, 1940; A. R. Werner, *La Croix-Rouge et les Conventions de Genève*, 1943; and J. Cazeneuve, *Essai sur la psychologie du prisonnier de guerre*, 1944.

Prisons. The idea of using P. as places of punishment is comparatively recent. Well into the nineteenth century the punishment for all felonies was death and, for misdemeanours, fines, whipping, the pillory or the stocks. P. were used in the first instance for safe custody and for assisting the Crown to exact its fines, whilst the bridewells were intended to provide work for the unemployed and those who refused to work. During the eighteenth century the distinction between these two types of jails was largely obliterated. The jails of that period and the first part of the nineteenth century were morally degrading and utterly insanitary, and it was against these conditions that first John Howard and later Elizabeth Fry (q.v.) agitated.

The jails were generally run for private profit and in so far as there was supervision it was the responsibility of the justices and the local authorities. The

state was, however, responsible for the convicts. Convicted felons who were not put to death had been deported to the colonies; as this became increasingly difficult, alternatives had to be found. The first state penitentiary was built at Millbank in 1821. In 1877 all P., whether convict estab. or local P. were placed in the charge of the Home Office. A board of Prison Commissioners and Directors of Convict Prisons was estab. for their general superintendence. All sentences of three years and upwards were served in convict P. and shorter sentences in what were still called local P. Gradually the regime of the two types of P. was brought closer together until the difference was little more than a name. The distinction was finally abolished by the Criminal Justice Act (1948) with the abolition of penal servitude.

The design of the nineteenth-century P., starting with the 'model prison' of Pentonville in 1842, was based on the belief in separate confinement. Partly this was a reaction against the lack of segregation of the early P., partly the result of a genuine conviction as to the moral value of solitary meditation. Unfortunately most of these P. are still in use. Work in them, typified by the treadmill, was exhausting and, of set purpose, without practical utility. By the end of the century doubts were beginning to be felt about this system. A royal commission was accordingly appointed. Its report, pub. in 1895, vigorously condemned the existing system for its demoralising effects. The commission considered that the aim of a prison system should be 'to awaken the higher susceptibilities of prisoners... and whenever possible turn them out better men and women physically and morally than when they came in.' This statement brought to the fore the fundamental question of the purpose of P. Should they aim primarily at deterring the potential criminal through fear of a prison sentence or at reforming the prisoner? The modern point of view is that in so far as fear of punishment can prevent crime, the shame of imprisonment, the loss of liberty, and separation from all home ties, is as effective a deterrent as possible. The material conditions of prison life, however unpleasant, do not add anything to its deterrent value. Their nature may, however, easily add to or detract from its reformative value. Though the reformative aim is to-day wholly accepted in theory, in practice a certain duality of purpose still remains. The old buildings still create an atmosphere of repression and having been built for deterrence can only be partially adapted to a reformative process. Inadequate space makes vigorous exercises impossible. It frequently prevents the provision of really good workshops and hampers the introduction of other activities that would be valuable for training.

During the first quarter of this century improvements were steadily introduced. Work in association was the rule and meals in association were allowed after a certain length of sentence had been

served. But it was still true that there was little positive training, since nothing was left to individual initiative or individual responsibility. Then an experiment of great importance was tried when special training for selected prisoners was introduced at Wakefield, with more responsibility, more freedom within the prison, and with a more vigorous regime. This was followed up in 1936 by the opening of a camp some m. from Wakefield (New Hall Camp) where selected prisoners live in open conditions. This was the first 'prison without bars.' The belief that lies behind this development is that prisoners cannot be trained to make good use of liberty if they are denied all freedom of choice and all responsibility. It is not intended that life in the open P. should be easier than in the old P. Actually it is more vigorous and makes more demands on the prisoners both physically and mentally.

The Second World War for the time stopped further developments along these lines, but much has been done since. Maidstone prison, with an ancillary camp, is now a training centre for the S.E. Sudbury Park (Derbyshire) has been started as an open training centre for the Midlands and Ley Hill as an open prison for convicts. There are also small camps in connection with Stafford and Exeter. There is one open prison for women at Askham Grange near York. In spite of these developments, in 1947 only about one-tenth of all prisoners were detained in open conditions (this was before Sudbury opened). Whilst maximum security will always be necessary for some prisoners the limits in the development of open P. has certainly not yet been reached.

Wakefield was also the first prison where the experiment of paying wages was tried out. This so clearly improved both the work and morale that it became the rule. The sums earned, however, are small. At the beginning of 1949 the maximum for men was only 1s. a week. It is now about 3s., though the average is much less. In 1949, all prisoners were included in the scheme from the beginning of their sentence. Previously earnings only began after the first month. (It should be noted that in 1947, 23 per cent of the men and 39 per cent of the women had sentences of a month or less and were therefore altogether excluded from the earnings scheme. In 1938 the corresponding figures had been 61 per cent and 71 per cent.)

Whilst wages may provide an incentive to good work, an even greater incentive is interesting work. Here prison work largely fails. Few of the workshops are well equipped. In 1947 about one-third of all prisoners available for work were engaged on making or repairing mail bags. A very small number of prisoners are given vocational training in certain trades; a larger but still small number go out to work, mostly in agriculture. In 1947 this latter number was 968 out of a total of nearly 13,000 effectives and the number is tending to

decline. The employment of a shifting and largely unskilled pop. presents a difficult problem, but the difficulties are intensified by the desire to prevent obvious competition with outside industry and the consequent restrictions placed on prison labour. Actually this competition must exist whether hidden or not.

Though much prison work is without educative value, educational facilities of other kinds are increasing. Evening classes in most P. are now provided by the local authorities, instead of by voluntary workers, and prison libraries are linked to the bor. or co. libraries. Correspondence classes are also provided in some number. The provision of books and classes helps to prevent the mental stagnation that was an outstanding feature of prison life in the past. Though voluntary workers are no longer used for prison classes, they still function as prison visitors, providing a link with the outside world and an unofficial, human relationship. Their work is valuable but there is still room for more visitors with good qualifications.

One modern development, still on a small scale, is the provision of psychiatric treatment. Wakefield has its own psychiatrist. Other long-term prisoners can be sent to Wormwood Scrubs for treatment. A scheme has been drawn up to allow outside psychiatrists to attend short-term prisoners during their sentence with the hope that treatment will be continued after discharge. The scheme was only operating in one area in 1948. Though psychiatric treatment is essential for rehabilitation in some cases, it is admitted by the authorities themselves that prison does not provide a favourable background and that a special institution is needed.

Young prisoners (under twenty-one) are treated as a special class. They may only be sent to certain P. where they are kept in a separate wing and an attempt is made to give them more active training than prison life usually affords. Lewes Prison is the only one used entirely for young prisoners. These special arrangements are recognised as merely reducing the evils inherent in detaining young persons in prison. Hence the proposed substitution under the Criminal Justice Act, 1948, of detention centres (see *under CRIMINAL LAW*).

The Criminal Justice Act introduced a new type of sentence, corrective training, a sentence of two to four years for persons with at least two previous sentences of a certain degree of seriousness. During the first ten months of its existence sentences of corrective training were passed on 1028 men and 48 women. Special wings at Chelmsford, Liverpool, and Wormwood Scrubs are being used for the majority. Some (in Dec. 1949) were still in local P. though it was hoped to absorb them as other special wings were opened. Reading Prison is being used as an allocation centre. There is a larger number of supervisory officials than for other prisoners and the aim is to get more personal knowledge of the prisoners than is generally possible, including knowledge

of home conditions, so as to find out the root of the trouble. Prison punishments are strictly controlled by regulation, the power of the governor being more limited than that of the committee of visiting justices. Punishments may take the form of loss of privileges, restricted diet, forfeiture of association, or cellular confinement. Associated with any punishment there is loss of remission. Unless forfeited by misbehaviour, prisoners receive remission of a third of their sentence. Visiting committees can order a prisoner to be flogged or birched for mutiny or violence to an officer. This is subject to confirmation by the secretary of state.

In 1947 there were thirty-five men's P. (with or without a wing for women) and three P. for women only. The average daily pop. was about 13,300 men and rather under 900 women. The figures for 1949 are considerably higher. This increase is primarily due to longer sentences. As a result, about 2000 men on an average were sleeping three in a cell. The use being made by the courts of the sentences of corrective training and preventive detention is likely to increase this pressure. The prison commissioners deal only with P. in England and Wales. Scottish P. come under the secretary of state for Scotland. The advisory committee to the secretary of state have recommended changes which if carried out would place the Scottish P. well ahead of the Eng. They include the payment of higher wages and the provision of a period of home leave for long-sentence prisoners towards the end of their time. The Criminal Justice Act (Scotland), unlike its Eng. equivalent, has abolished corporal punishment in the P. But even before, it could only be used at Peterhead convict prison.

As regards comparison with foreign countries, if open P. are accepted as desirable, the Scandinavian countries lead the way. In Sweden, when the new scheme is in full operation, open P. will be the rule after the first three months with certain very limited exceptions. Prison earnings are much higher than in England and part of the earnings are set aside for the prisoner on discharge. Home leave for prisoners has been introduced. Denmark has become the pioneer in the treatment of psychopathic prisoners in the special institution at Herstedvester. In the U.S.A., P. vary greatly as there are both Federal and state P. besides the local jails. The latter are much criticised by the Amers. themselves. In some respects America has been ahead of Britain. The state institution for women at Alderson, for example, provided an educative open prison for women many years before any such development here. On the other hand some of the state P. are more repressive than anything in Britain. On the whole Amer. pris. sentences are considerably longer. Such features as wireless in the cells, which are to be found in some P., are doubtless in part due to the greater difficulty of preventing mental deterioration with the long sentence. America makes use of the indeterminate

sentence within a fixed maximum and minimum term. The date of release on parole is determined by a general assessment of the prisoner's character. There is no fixed allowance of remission as in Great Britain.

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Prisrend, or **Prisren**, cathedral city of Serbia, Yugoslavia, 88 m. N.W. of Monastir, in the dept. of the same name. There are textile, metal, and glass industries. It was occupied by Serbia in the Balkan war of 1912. Pop. 19,800.

Prishtina, tn. of Serbia, Yugoslavia, 60 m. N. of Skopje (Uskub). There is trade in grain and wine. P. was captured from Turkey by Serbia in 1912. Pop. 19,800. See also BLACKBIRDS, FIELD OF.

Pristis, see SWORDFISH.

Pritchett, Victor Sawdon (b. 1900), Eng. author and critic, b. at Ipswich, and educated at Allyn's School. He spent much of his early life on the Continent and his work shows signs of Fr. and Sp. literary influence. His novels include *Clare Drummer* (1929); *Shirley Sanz* (1932); and *It May Never Happen* (1946); and are distinguished by their analytical quality and realism. As a critic, he has pub. *The Living Novel* (1916).

Prittwell, see under SOUTHDEN.

Private, see under RANK.

Private Bills, see under PARLIAMENT.

Private Company, see COMPANY AND COMPANY LAW, *Private Companies*.

Privateers, armed vessels owned and officered by private individuals, but acting under a commission from the state, known as letters of marque, which allowed the owners to keep the prizes they captured, and granted them £5 for every man of the enemy killed or taken. By the Declaration of Paris in 1867, privateering was and remains abolished between the signatory nations when engaged in war with each other. See W. B. Johnson, *Wolves of the Channel*, 1931, which traces the hist. of Fr. privateering from the seventeenth century to the days of its extinction.

Private International Law, see CONFLICT OF LAWS.

Private Presses, see under PRINTING.

Privet, or *Ligustrum*, genus of evergreen shrubs. Common P., *L. vulgare*, a native species, is a useful hedge plant, especially in tea.

Privilege. In the law of defamation, some kinds of statements are in the exceptional position of being absolutely privileged, e.g. statements made in the witness box; but most kinds of statements entail on the persons who make them unqualified responsibility for all the natural conse-

quences that may flow from them. But there is a middle class of statements which are privileged so long as the person about whom they may be made cannot prove actual ill will, spite, malice, or indirect motive in the utterer. Social relations render it imperative that the law should protect the honest expression of opinion concerning the character and merits of persons to the extent appropriate to the nature of the occasion on which inquiry is made relative to such character or merits, and indeed in most cases persons are under a social duty to make such communications. Such occasions are privileged, and communications made conformably to the duty or right incident to them are said to be privileged by the occasion. See CONFIDENTIALITY; and for the Ps. of Parliament, see under PARLIAMENT. See also DEFAMATION.

Privileged Communications, see CONFIDENTIALITY; DEFAMATION.

Privy Council, advisory body of the Brit. sovereign, possessing judicial powers. The present P. C. exists as the machinery by which the Cabinet expresses the royal pleasure, or, in other words, it notifies by proclamation (q.v.) or by Order in Council (q.v.) the will of the executive. But the fact that it possesses no administrative powers and only such powers of legislation by Order in Council as correspond to the dwindling *personal* prerogatives of the king, and that both it and the Crown, regarded as an integral part of the gov., have long been superseded by the Cabinet, has resulted in the position that all the anct. and imposing privileges and powers of the P. C. have devolved on the latter body in spite of the legal theory that the privy councillors are the only ministers recognised by law. The apparent incongruity of a *de facto* body of ministers not only wielding the whole of the executive power of the state but initiating all the important legislation (see CABINET; GOVERNMENT; PARTY (GOVERNMENT); PARLIAMENT), while the *de jure* body does no more than give formal expression to such part of the executive will of the state as still nominally falls within the purview of the Crown prerogative (see CROWN), is mitigated to some extent by the fact that the whole of the Cabinet are *ex officio* members of the P. C. In short, apart from its judicial power, the P. C. is restricted at the present day to a more or less nominal exercise of prerogative powers, e.g. the proclamation of ports or fairs, and the formal declaration of war. The hist. of the P. C. is, in a sense, that of the Cabinet, for the latter body was evolved from the unwieldy council of the time of Charles II. It is by no means easy to trace the hist. of the modern P. C. prior to the reign of Henry VI. because its ultimate progenitor was no less a body than the *Curia Regis* of the Norman period, from which parent body there issued in the course of time not only the P. C. but the House of Lords, the various divs. of the High Court of Justice, including the system of itinerant or circuit justices, the Star Chamber, and High Commission

Court. This evolution indicates no more than a necessary div. and specialisation of executive authority in a state polity which has at length become too complex and too artificial for the simple analysis into a king exercising, according to his lights and ability, more or less autocratic powers, and a council of barons exercising advisory functions which waxed and waned according to the degree of the royal ascendancy. Hence many historians, like Gneist, Stubbs, and others, are content to describe the development of the P. C. from the council of Henry VI., when the term P. C. was applied more especially to the paid and sworn councillors who habitually attended and took the oath of secrecy. The personnel of the P. C. varied from time to time up to the year 1641, magnates or nobles alone figuring on it up to the Wars of the Roses, commoners and persons of humble birth, being introduced to the council board after those wars in consequence of the ravages made in the more ant. and noble families. Further, there was a differentiation into *ordinary* and *privy* councillors, the former being merely legal advisors, and members of the Star Chamber, the latter ministers of state. Apparently the ordinary councillors only attended when summoned, and from the fact that the present custom is for members not to assert their right to attend in the absence of a special summons and (perhaps) from the fact that the most striking of the surviving powers of the P. C. are its judicial functions, it is inferred by historians that the *ordinary* councillors of the Tudor and early Stuart period are the *direct* predecessors of the modern *privy* councillors. After the abolition of the Star Chamber and the restoration of 1660, when all members of the P. C. were sworn, it would seem that a further and different development took place: the P. C. grew in numbers so that groups within the main body, such as the Cabal of Charles II., began to form. This tendency to subdivision to further efficiency eventually resulted in the modern Cabinet, the larger body gradually losing administrative powers and evolving into the modern formal P. C.

Position of the Modern Privy Councillor.—Privy councillors are nominated by the sovereign, and on being appointed go through the formality of kissing the sovereign's hand and taking an oath to this effect: (1) To advise the king according to the best of their cunning and discretion; (2) to advise for the king's honour and public good without partiality; (3) to keep secret the king's counsel; (4) to avoid corruption; (5) to help and strengthen the execution of what shall be resolved; (6) to withstand all persons who would attempt the contrary; (7) to observe, keep, and do all that a good and true councillor ought to do to his sovereign lord. This oath, as may be imagined, is an ant. one, and in its extent far more applicable to those members of the P. C. who are also members of the Cabinet; indeed, as applied to the *privy* councillor, *qua* *privy* councillor, it is more or less unmeaning in

its pledge of secrecy, for the chief remaining duty of the P. C. is to *proclaim* to the world the will of the executive. A *privy* councillor is *ex officio* a justice of the peace for every co. in England. The head of the P. C. is the president of the council, and the person selected for this dignified office is usually an experienced parliamentarian. Privy councillors hold office during the life of the monarch, but a new sovereign always continues the old councillors in office, and, indeed, is bound to continue in office such of them as are Cabinet ministers at the time of the demise of his predecessor. Some persons are appointed members of the P. C. not because their assistance is required but as a mark of honour on account of personal distinction in some sphere. There is now a King's P. C. for Canada, composed of the ministry and of members outside the ministry. Non Cabinet members number at present (1950) 256. Federal premiers of Australia are *ex officio* *privy* councillors. For the judicial committee of the P. C., see JUDICIAL COMMITTEE OF THE PRIVY COUNCIL.

The Privy Council Office.—Though from time to time the P. C. has been shorn of its administrative functions—thus the Board of Trade and the Ministry of Education are now separate from the council—it has often received new duties. The growth of professional organisations with statutory powers of regulating entry into and discipline within their professions has added new functions. The chief subordinate dept. is the Dept. of Scientific and Industrial Research, a prerogative dept. possessing statutory functions. This dept. in turn has the Geological Survey, the National Physical Laboratory, and some other research stations under its control. Charters are granted by the Crown on the advice of a committee of the P. C. Hence, the administrative questions involved in the grant of charters to univ., municipal bors., and other bodies are dealt with by the P. C. Office. The Judicial Committee of the P. C. advises the Crown on appeals from courts in the Brit. Commonwealth overseas. Appeals, however, now lie only from Australia, New Zealand, and Ceylon, and from the colonies, the right having recently been abolished in the case of Irish, Canadian, Indian, and S. African appeals. The most important professional bodies attached to the P. C. are the General Medical Council and the Medical Research Council. Recent legislation has added to them the Architects' Registration Council, the Dental Board, and the Pharmaceutical Society. These are independent professional bodies, but the P. C. has certain powers of control.

See W. Stubbs, *Constitutional History of England*, 1884–1903; A. V. Dicey, *The Privy Council*, 1887; J. F. Baldwin, *The King's Council in England during the Middle Ages*, 1913; J. E. A. Jolliffe, *Constitutional History of England from the English Settlement to 1455*, 1937; B. Wilkinson, *Studies in Constitutional History of the 13th and 14th Centuries*, 1937; and D. L. Keir, *Constitutional History of Modern Britain, 1485–1937*, 1938.

Privy Seal, see SEAL.

Privy Signet, see SIGNET.

Prize Court. P. Cs. are estab. in belligerent civilised states to investigate cases of maritime capture and to condemn property as lawful prize or award restitution and compensation. According to Eng. Admiralty law 'prize' extends to all property captured *jure belli* on the sea or in foreign ports or harbours; or captured on land by naval forces acting alone or jointly with land forces; money received by way of ransom; and property captured in the rivers, ports, or harbours of the captor's country. P. Cs. adjudicate on property belonging to both enemy belligerents and to neutrals and are open to all persons regardless of nationality. They are national tribunals, though they administer rules which may be based on international law. They in fact do administer international law (Privy Council in the *Zamora*, 1916) though the Ger. P. Cs. always insisted that they apply municipal law (see on this the *Panaghiotis*, 1943, for a statement on this point). The law administered by the Amer. P. Cs. is, as in the case of the Brit. P. Cs., international law (*Paquete Habana*, 1900). P. Cs. are not bound by an Order in Council which is contrary to international law.

At the second peace conference at The Hague, 1907, and the London conference, 1908, an attempt was made to establish an international court of appeal to which neutrals, and in certain cases belligerents, might have recourse when dissatisfied with the decisions of the P. Cs. of the captor, but though this was agreed upon in the Declaration of London (q.v.) no such court was set up. P. Cs. may not be set up by a belligerent in neutral ter., though they may sit in the ter. of an ally. Neutral courts may exercise prize jurisdiction where the prize was taken in violation of the national ter., and where the prize was captured and abandoned and is the subject of a salvage claim by the neutral power. The decision of the P. Cs. is final, though the territorial state is internationally responsible; hence a neutral state may claim satisfaction if aggrieved by the decision.

When a belligerent captures a commissioned vessel belonging to the enemy gov., she becomes on capture his own property, and he is entitled to deal with her as he pleases. All persons found on board become prisoners of war, and all goods become the property of the captor. In the case of an enemy merchant ship there is neither unanimous opinion nor uniform practice as to the relation of seizure to ownership. In practice, systematic destruction of enemy prizes has been the exception, and the general rule is that all prizes are brought in for adjudication, unless there are practical difficulties in the way of such a course. During the First World War the Br. P. C. adopted the rule that the destruction of an enemy merchantman is legally justifiable, when the circumstances of the case imperatively demand it (the *Mahroussa*, 1915). The same principle was held to be applicable

to absolute contraband (q.v.) cargoes. On principle, there can be little doubt that, if the right to capture private property is conceded at all, the destruction of enemy prizes is justifiable in circumstances of *force majeure*; the chief safeguard against it lies in the fact that it is contrary to the interest of the captor to destroy what is certain to become his own property, if such destruction can be avoided. The obligations of belligerents with regard to enemy merchantmen apply much more emphatically to the case of neutral merchantmen, so that the precedents cited for the former may be invoked *a fortiori* for the latter. Under the customary law it has long been an estab. rule that captured neutral vessels must be taken in for adjudication, and if this be found impossible they must be released, even if there be a doubt whether they are neutral or enemy. The plea of military necessity will not avail; and the captor may not arrogate to himself the functions of a judicial tribunal. It is only a valid condemnation of a P. C. that transfers the ownership to the captor; till then he may not deal with the prize as he deems fit. So long as neutral vessels do not violate their neutrality they must be left alone, subject to visit and search in case of suspicion. It has, however, been recognised, even in Brit. courts, that there may be exceptional cases in which destruction may be justified, though not without paying full compensation to the owner. But the question whether the destruction of a neutral ship is justified in cases of absolute military necessity and other exceptional circumstances has been much disputed. The unratified Declaration of London (1909) provided that they must be 'taken into such port as is proper for the determination there of all questions concerning the validity of the prize'; but Articles 50-51 provide that they may be destroyed if the safety of the captor is involved or there is exceptional military necessity; and further that all persons on board must be placed in safety and the ship's papers must be taken on board the warship. During both world wars, however, Germany sank many neutral vessels without providing for the safety of those on board. By the treaty of Washington, 1922, it was declared that a merchantman must be ordered to submit to visit and search before it can be seized and must not be attacked unless it refuses to submit to visit and search or to proceed as directed after seizure; that a merchantman must not be destroyed unless the crew and passengers have been first placed in safety; and that belligerent submarines are not under any circumstances exempt from the universal rules above stated.

See O. J. Colombos, *Law of Prize*, 2nd ed., 1941; A. P. Higgins and O. J. Colombos, *International Law of the Sea*, 1943; L. Oppenheim, *International Law*, vol. 2: *Disputes, War and Neutrality* 6th ed., by H. Lauterpacht, 1944; S. Jackson, *Manual of International Law*, 2nd ed., 1947; also E. S. Roscoe, *Reports of Prize Cases 1745-1853*, 2 vols, 1905.

Prize-Fight, boxing contest, fought with bare fists, for a money prize. It is forbidden in Britain and the U.S.A., gloves always being worn in contests. P.-fs. were popular in England, 1750-1850.

Prize Money originated in remote hist. to encourage adventurous spirits to take to the sea. In 1243 Henry III. created the first privateersmen, who were allowed to indulge in what were virtually piratical activities at sea so long as they gave half the spoils—or prize—to His Majesty. Thus for many centuries prize was the only thing to recommend a life at sea and there were many opportunities, especially in the Elizabethan era, for fabulous captures. In fact, privateering was not abolished until the Declaration of Paris in 1856. In the Commonwealth Act of 1649 the half share previously claimed by the king went to the treasurer of the Admiralty for charitable purposes, but it was not until the reign of William and Mary that pillage was abolished, and an Act passed under which everything in a captured ship had to be condemned as prize and then distributed among the captors. In the reign of Queen Anne (1702-14) the prize fund was vested in the Crown, and a substantial portion of it in the shape of a grant then made to the captors for whom an exact ratio of shares was now laid down.

During the period of the Georges large fortunes were again made out of P. M. Adm. Lord Anson, for instance, in a voyage round the world, took over £1,000,000 in P. M. of which his share came to £125,000. Later, after the battle of Cape Finisterre, the resultant rounding up of a Fr. convoy brought him another £62,991. Adm. Sir Charles Saunders, when commander-in-chief Mediterranean, captured the Sp. treasure ship, *Hermione*, on May 21, 1782 as a result of which his share was £64,963, while every lieutenant concerned received £13,000 and each seaman and marine £485. In addition to P. M. derived from the value of a ship and its cargo, a system of bounty had been introduced by which those officers and men of a ship of war actually present at the capture or destruction of an enemy ship were entitled to have distributed among them a sum calculated at the rate of £5 for each person on board the enemy's ship at the beginning of the engagement.

At the beginning of the First World War it was recognised that modern conditions made it unfair to adhere to the old rule of distributing P. M. only to the actual captors, and it was decided that all those serving in the R.N. at sea should be eligible. At the end of that war P. M. amounted to some £14,000,000 out of which admirals received approximately £3000, captains £800, and able seamen £25. During the Second World War, however, the enemy did not allow so many of his ships to be captured and scuttled them instead. As a result, the total P. M. only amounted to £7,250,000, of which £2,000,000 was allocated to the Commonwealth countries and £1,250,000 to the R.A.F. without whose co-operation

many captures would not have been made. The £4,000,000 left to the R.N. was then distributed in more equal ratios among those who had spent 180 days at sea during the war. This embraced some 57,000 officers and 598,000 men. So an admiral of the fleet only received £40, a captain £16, a lieutenant £13, a petty officer £6, and a seaman £4. Meanwhile the Air Council had decided that as they could draw no distinction between individuals of different commands—which meant that the individual share would be very small—they would apply the entire amount to R.A.F. benevolent and welfare funds.

It had, however, previously been announced on Dec. 19, 1945, that P. M. was now going to be paid for the last time as, under modern conditions, it raised so many anomalies and inconsistencies. In future, should hostilities again break out, it will be assimilated into the normal grant of gratuities.

Prizzen, see PRISREND.

Prizzi, tn. of Sicily, in the prov. of Palermo. Pop. 10,800.

Proa (Malay *prahu*), narrow canoe, 30 ft. long by 3 ft. wide, used by natives of the Ladrone Is. The stem and stern are similar, the boat sailing either way. The lee side is flat, so that the canoe resembles half of a vessel, divided vertically in the line of the keel, and a weighted framework is swung out to leeward to adjust the balance.

Probabalism, in moral theology, denotes the view that when a person is unable to obtain a sure decision as to the lawfulness or unlawfulness of an act, he may act upon a solidly probable opinion in the opposite sense. P. was first elaborated by Molina (q.v.) and was taught by the Jesuits. It was opposed by the Jansenists (see Pascal's *Lettres provinciales*), but as expounded by St. Alphonsus Liguori (1696-1787) is held by most modern theologians.

Probability (in logic) the presumption that some statement is likely to be true or that some event is likely to happen, when sufficient evidence to constitute absolute proof cannot be secured. The term is also applied in logic and mathematics to the amount of antecedent likelihood which exists for the occurrence of a certain event, as calculated from the relative frequency of the occurrence of similar events in the whole range of past experience. In this connection the investigation of P. has been performed chiefly in connection with games of chance. The first work to treat of this was Demolivre's (q.v.) *Douctine of Chances*, and the subject is worked out with especial fullness in such works as J. Venn's *Logic of Chance* (ed. 1888). The same question of P. is the basis of the work of all insurance societies, and their success depends almost entirely upon the accuracy of the formulae and results obtained by their actuaries. The whole subject forms an important branch of mathematics.

Probability (in mathematics) is that part of algebra which deals with the P. of chance of the happening of an event

or any one of a number of events one of which must occur. The general definition of P. is stated thus: If an event can happen in a ways and fail to happen in b ways, and except for the numerical difference between a and b is as likely to happen as to fail, then the P. of its happening is $\frac{a}{a+b}$ and that of its failing $\frac{b}{a+b}$. For

example, consider a bag containing six white balls and seven black balls, and apart from the difference in the numbers we are as likely to draw white as black, then the P. of drawing white is $\frac{6}{13}$, and of drawing black $\frac{7}{13}$. This P. does not state which will actually happen, but that if an infinite number of trials be made, the number of times a white ball is drawn will not deviate very far from this ratio. This method is used in the data of assurance companies in estimating the P. of the occurrence of events. *Certainty*, i.e. that the event will occur without fail, is expressed mathematically as unity, as may be deduced from the definition. Hence, if a be the P. of the occurrence of an event, $1-a$ is the P. of its non-occurrence. A few simple laws of P. may be stated: (1) If different events are mutually exclusive, i.e. the occurrence of one event prevents the occurrence of another, the P. of either event occurring is the sum of the Ps. of the separate events. (2) If a and b are the Ps. of two independent events, the P. that both should happen is ab ; e.g. find the P. of throwing heads twice in two tosses of a coin. For one throw the P. of throwing heads is $\frac{1}{2}$, hence for two it is $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$. (3) If the P. of the happening of an event in one trial be p , the P. of its happening r times in n trials is the $(r+1)$ th term in $(p+q)^n$, where q is the P. of its not happening in one trial, i.e. $q = 1-p$.

Expanding this by the binomial theorem,

$$(p+q)^n = p^n + np^{n-1}q + \frac{n(n-1)}{2} p^{n-2}q^2$$

$$+ \frac{n(n-1) \dots (n-r+1)}{r!} p^{n-r}q^r$$

$$+ \dots + q^n. \text{ The } (r+1)\text{th term} = \frac{n(n-1) \dots (n-r+1)}{r!} p^{n-r}q^r.$$

Two or three examples may be taken to illustrate the type of problem solved by P.: (1) Three cards are drawn from a pack at random; find the P. that they will consist of a knave, a queen, and a king. The knave, queen, and king can each be drawn in four ways; any three cards can be drawn in $\frac{52 \cdot 51 \cdot 50}{2 \cdot 3}$ ways; \therefore required

$$\text{chance is } \frac{4^3}{\frac{52 \cdot 51 \cdot 50}{2 \cdot 3}} = \frac{16}{5525}. \quad (2) \text{ In a game}$$

A's skill is to B's as 3 to 2; find the chance of A winning 3 games at least out of 5. As in law (3) A's chance of winning is $\frac{3}{5}$ and of losing $\frac{2}{5}$. Therefore required chance is the first three terms of $(\frac{3}{5} + \frac{2}{5})^5$ which reduces to $\frac{11}{31}$.

Probate. P. of a will means the production of it before the P. court (*q.v.*) or the registrar of that court for the purpose of establishing its validity and genuineness. There are many things which an executor can do without getting P. of a will, but he cannot sue as an executor of the will in any court without producing the P. or copy of it sealed and registered by the court in which it was proved. As a testator may appoint any number of executors, P. may be granted to all of them; but a grant of P. to one executor only enables all to act upon it, with the result that in most cases it is unnecessary for the others to prove. A will may be proved either in *common* or *solemn* form. A will is said to be proved in common form when P. is granted in the absence of the parties interested under the will, but on proof of its identity and genuineness; in solemn form, when a final decree is pronounced by the court. In the latter case the executor must cite the various parties entitled to the property, whether under the will or on intestacy, and satisfy them before the court that the will was duly executed and that the testator was in full possession of his faculties when he made the will. The cited parties have full liberty to dispute the will. P. in common form is revocable; but P. in solemn form is irrevocable as against all the persons cited unless a subsequent will be found.

Probate Court. The probate, divorce, and admiralty div. of the high court, owes its existing name and constitution to the Judicature Act, 1873. Prior to that Act there was a court of probate and a court for divorce and matrimonial causes, both presided over by one judge as judge-ordinary and president respectively, while the former court of admiralty was a separate tribunal with a separate judge. There are now two courts of the probate, divorce, and admiralty div., one of the judges being styled president. The probate side of the court is concerned with proving wills and granting letters of administration (*see* PROBATE).

Probation, see under CRIMINAL LAW.

Proboscidea, see ELEPHANT.

Proboscis Monkey, large Bornean species of leaf-eating monkey (*Nasalis larvatus*) in the male of which the nose is prolonged to hang below the upper lip. It is red in colour.

Probus, Marcus Aurelius (A.D. 235-82), Rom. emperor (276-82). He served with distinction under Valerian and later emperors in Africa, Asia, and Germany. Tacitus (275-76) made him governor of Rome's Asiatic possessions, and on his death, the army chose P. as emperor. He fought successfully against the Gers., driving them out of Gaul, but was murdered by mutinous soldiers. *See* Aurelius Victor, *De Cæsaribus*, and *Epitome*; Champigny, *Les Césars*, 1843.

Process, in law, the whole course of proceedings in a civil or criminal cause. In a more limited sense P. denotes either (a) the writ of summons, warrant, or other instrument by which the defendant is compelled to appear in court, or (b) the

writs which issue at the instance of a party to a suit to compel the other party or some third person or persons to do some act connected with the proper trial of the action, e.g. a writ of *subpoena duces tecum*, to compel the production of documentary evidence (see also MESNE, *Mesne Process* and INTERLOCUTORY PROCEEDINGS). In Scots law P. means the proceedings in a cause and the documents relating to it.

Processions are either secular or religious. Secular P. take place on certain great occasions, usually with the object of allowing some important personage to be seen by the people. Religious P. early formed part of the Christian liturgy (e.g. on Candlemas Day, Feb. 2, and Palm Sunday) and were also held on special occasions to beg some special favour from God (e.g. by St. Gregory to implore a cessation of the plague). They became especially magnificent in the Middle Ages, and at the present time in the Church of Rome they continue to form a specially regulated part of the worship. They have been extensively revived in the Anglican communion, and the practice of par. P. on the Rogation days is not uncommon.

Process Work, or more correctly, **Process Engraving**, term generally understood to denote the photo-mechanical method of reproducing drawings or objects on a relief printing plate, or block. The definition thus excludes intaglio and planographic methods such as photogravure (q.v.) and photolithography (see under LITHOGRAPHY). There are obvious practical advantages in having illustrations in the form of relief blocks, rather than drawn on a lithographic stone or engraved in a copper plate. The printing image on a relief block is raised above the surrounding areas and this same principle operates when printing from type. The printer can therefore lock up type and illustration blocks in the same forme and print them both in the one impression. Books have been illustrated in this fashion since the earliest days of printing, and the kind of block largely used over the course of four centuries, prior to the advent of photography, was the hand-engraved wood block. In the nineteenth century the rapid expansion of commercial printing in the realm of periodical and magazine work as well as books, saw the growth of professional engraving. The engraver was not necessarily a creative artist himself, but simply trans. other artists' work into a form acceptable to the printer, often with an amazing virtuosity. With the existence of such a demand for the engraver's work, now quite divorced from the artist, the time was ripe for a mechanical method of block-making that would eliminate the laborious hand work involved.

The early part of the nineteenth century, which saw the beginnings of so many of the mechanical methods in use in the production of printed work, and the materials on which the printer relies, saw the first gropings in the attempt to use the action of light in order to obtain

an exact reproduction of a design or image independently of the uncertainties of hand work. The earliest attempts in this direction were made by Joseph Nicépce, of Chalon-sur-Saône, who, in 1813, took up the study of lithography, but, having some difficulty in supplying himself with the proper stones, started a series of experiments with tin plates coated with resins known to be sensitive to light, especially bitumen, which also possesses the property of becoming insoluble if sufficiently exposed to sunlight. He applied to his tin plates a solution of bitumen dissolved in oil of lavender. When dry, he placed the plates under copies of engravings and exposed them to sunlight, afterwards developing the resulting image with a mixture of oil of lavender and petroleum. This solvent also washed away those portions of the varnish which had been protected from the action of light by the details of the engraved print, leaving the bare metal; the plate was then etched with acids and an intaglio produced, from which prints could be taken with the aid of a copper-plate press. Incidentally his experiments in this direction, with copper plates surfaced with silver, in conjunction with his partner Daguerre, led to the perfecting by the latter in 1839 of the first successful method of producing the photographic image (daguerreotype), thus in effect laying the foundation of all the modern process work as we know it. Nicépce was the first to engrave on metal by mechanical and chemical action, and print copies from the plate. It will readily be seen that from this successful result it was comparatively easy to get away from the slow and costly printing method of the copper-plate press and, by a reversal of the process of etching the black lines into the plate, produce a relief printing surface which could be easily and rapidly used by a letterpress printer.

Process engraving to-day can be divided into two separate categories, line engraving and half-tone engraving. Line engraving is the method used to reproduce drawings on which the artist has worked in sharp black and white definition with no intermediate tone values, e.g. pen or scraper-board drawings (though mechanical stippling can be added to suggest middle tones). The process can be extended to reproduce drawings in more than one colour, provided the colours are solid and flat, and not of varying tonal strength. Half-tone engraving is used to reproduce original subjects consisting not only of contrasting black and white but also intermediate tones of varying depth, e.g. photographs, wash drawings, and pencil sketches. In the field of colour it is capable of reproducing artists' fully coloured paintings, photographic colour-transparencies, and still-life subjects photographed direct. It will be understood from the principle of letterpress printing (see PRINTING) that a relief half-tone plate is only capable of printing an even film of ink on the paper. The appearance of intermediate tone values is therefore illusory and is created by a

regular series of dots of varying sizes, larger in dark areas of the image and becoming smaller, with therefore more white space between them, in the lighter areas. The comparison may be made here between this process and photogravure. The latter also prints a dot formation but as it is an intaglio process the ink is held in recessed cavities etched to varying depths below the surface of the plate. When printed the dots are therefore all the same size, but tonal variation is achieved by the amount of ink transferred to the paper, more in the darker tones and less in the lighter. This, combined with a slight tendency for photogravure to spread on

whole plate immersed in a bath of nitric acid. The acid attacks the unprotected parts of the plate, and after a series of controlled etches, the surface is eaten away and the image is left in relief. The plate is then cleaned up, finished off, mounted on wood to type-height, and is ready for printing. The method of making line blocks in colour varies according to the nature of the drawing supplied, and a process engraver generally prefers a series of working drawings made in black of each colour to be printed. If, however, a fully coloured original is supplied it may be necessary to make a tracing or 'key' of the outlines of all the colours. The key is



Odham's Photo-Engravers

Photograph by Harold Burdakin

HALF-TONE SCREENS

The three sections of this picture show the effect of a screen in a half tone block. On the left is a screen used largely by newspapers (65); that in the middle (85) and on the right (100) are used in journals and bookwork. The screen of blocks used in *Everyman's Encyclopedia* is 85 and 100.

the paper, gives a greater effect of continuous tone and a generally softer result than relief half-tone printing. The latter better reproduces sharp clear tonal contrasts. The following, briefly explained, are the details of line and half-tone process engraving.

Line Engraving.—A photographic negative on a glass plate is first made of the original drawing, an optical prism being placed at the camera aperture. The prism has the effect of reversing the negative image, so that at the final stage of the process it appears the right way round. A metal plate, usually zinc, is then coated with a light-sensitive solution of albumen and ammonium bichromate and the negative is then printed down on it. The light passing through the clear areas of the negative (the black parts of the original drawing) hardens the coating of the plate on which it falls and renders it insoluble in water. The surface of the plate is next rolled up with ink and washed in water which dissolves the unaffected parts of the coating, leaving only the original image. The image is then further treated with a powder of bitumen or resin to make it acid-resistant, and the

then printed down on to as many separate plates as there are colours to be reproduced. Guided by the key the etcher paints an acid-resist over ('stopping out') the portions of each plate which it is required to print in the various colours, and the plates are then etched in the usual manner.

Half-tone Engraving.—As noted above this process is used for reproducing continuous tone originals and relies on the use of a half-tone screen. This is a glass plate with a series of black lines ruled on it at right angles to each other. When placed in front of the negative in the camera the light passing through the interstices of the screen is broken up and falls on the negative as a series of dots, larger in the high lights and smaller in the shadows. The original continuous tone image is thus registered on the negative as a regular series of solid dots of varying sizes. Thenceforward the process is similar in principle to line engraving. Half-tone etching is a more highly skilled operation than line etching, as the etcher has by his own craft to make good certain deficiencies inherent in camera reproduction, replacing tones that have been lost in the

process. The tendency is for light and dark tones to even out, giving an overall flatness and lack of contrast. The plate is given a series of etches, a portion of the image being stopped out before each etch, commencing with the darkest tones and working to the lightest. The effect of this is to etch the shadows least and the high lights most, and by skilful work the tones of the original can be restored and even enhanced. The rulings on half-tone screens vary from 45 to 225 lines to the inch, the choice of screen ruling being governed by the quality of paper on which the finished block is to be printed: 85 screen is the finest suitable for newsprint or similar low-grade paper, 150 screen is the average for good quality catalogue or bookwork on coated art paper; finer screens are used almost exclusively for reproducing scientific or similar illustrations containing fine detail. Half-tone plates are usually made of copper, which is more malleable than zinc and less brittle after subjection to the heat that has to be applied at certain stages of the process.

Colour half-tone is founded upon the principle that all colour values can be broken down into (a) three primary sensations. From the coloured original a series of three half-tone negatives are made, the light being allowed to pass first through a glass filter, of a different colour for each negative. The three filters are violet, green, and orange (though usually referred to as blue, green, and red) and allow respectively the yellow, red, and blue components of the colours of the original to be recorded in their correct proportions on the three negatives. Half-tone plates are then made from the negatives and printed in yellow, magenta-red, and blue, in exact register to recreate the colours of the original. Yellow being the most opaque ink is usually printed first, and as it is also usually of the greatest colour-density of the three it provides a base on which the red and blue will print with more brilliance. For subjects that have heavy depths of tone it is usual to print a fourth plate in black, and this has also the effect of sharpening the final result and enriching the black tones. Here again much hand work is required to make good the inherent photographic deficiencies. A skilled colour-etcher must learn to recognise, for example, the size of screen dot that is required on any plate so that when combined with the others it will reproduce the correct colour value. Screens as coarse as 80 can be used for printing colour work on a non-coated paper, but for good quality work on art paper 133 and sometimes 150 screen are used. The process is capable of reproducing a wide range of subjects from works of art in oils to commercial studio drawings for magazine illustration and colour-transparencies such as Kodachromes and Ektachromes.

See W. J. Smith, E. L. Turner, and C. D. Hallam, *Photo-engraving in Relief*, 1932, and H. Curwen, *Processes of Graphic Reproduction in Printing*, 1934.

Procida, Is. of Italy, at the N.W. end of the bay of Naples, 2 m. from the main-

land. It is of volcanic origin. Vine-growing and fruit culture are important industries. At the tn. of P. on the N.E. coast there are extensive fisheries. Pop. (of Is.) 15,000; (of tn.) 3700.

Proclamation, constitutional mode of declaring the king's will (as to which see *under* Crown), or the will of the chief executive of a nation. For the most part Ps. can only be binding on the subject in so far as they are grounded on the law of the land. They are used for solemn declarations of war or peace, on ceremonial occasions, such as the calling of a court or the accession of a monarch to the throne, and for various other purposes. All Brit. Ps. are made by the king in council and must pass under the Great Seal (q.v.).

Proconsul. In ant. Rom, a P. was a consul whose year of office was prolonged in order to allow him to complete a victorious campaign. Later it became the general rule for a consul who had spent his year of consulship in Rome to become a P. for prov. war or administration. A P. had no power in Rome itself (c. 500-c. 560 A.D.).

Procrastes (Gk. Προκροστις, the Stretcher), in ant. Gk. legend, a robber of Attica, whose other name was Damastes or Polypemon. He forced his captives into a bed, and adjusted them to its length by racking or amputation. He was killed by Theseus.

Procter, Adelaide Ann (1825-1864), poet, was the daughter of Bryan Waller P. She contributed verses to *The Book of Beauty* in 1843, and subsequently to *Household Words* and the *Cornhill Magazine*. In 1858 she collected her poems and pub. them under the title of *Legends and Lyrics*. Some of her verses have charm and individuality. See E. S. Robertson, *English Poetesses*, 1883, and life by H. J. Gibbs.

Procter, Bryan Waller (1787-1874), Eng. poet, b. at Leeds; he practised successfully as a solicitor in London. He contributed to the *Literary Gazette* from 1815, and made the acquaintance of Lamb (whose biography he wrote in 1864) and Leigh Hunt, whose influence is perceptible in his writings, and also knew Robert Browning and Swinburne. Under the pseudonym of 'Harry Cornwall' he produced at Covent Garden a tragedy *Mirandola*, which ran sixteen nights (Jan. 1821), and *English Songs, and other Smaller Poems* (1832). It is by his songs that he is remembered. An *Autobiographical Fragment*, ed. C. Patmore, was pub. in 1877. See life by R. W. Armour, 1935.

Proctor, anglicised form of the Lat. *procurator*, an agent or manager. Technically the word means: (a) univ. officials selected from the masters of arts to enforce the univ. statutes and generally to maintain discipline and good order, and (b) representatives of cathedral or other collegiate churches and of the ordinary diocesan clergy in convocation. It was formerly also used to denote practitioners in the eccles. and admiralty courts, but this use of the word is obsolete since

Parliament enabled solicitors to perform all the legal duties of a P.

Procurator, in a general sense signifies a manager or agent, but has come to denote exclusively solicitors or 'law agents' in Glasgow and other Scottish dists., who practise in the inferior courts, and are members of the Incorporated Society of Ps. The Law Agents Act, 1873, placed Ps. in all respects on the same footing as other law agents.

Procurator-fiscal, in Scotland, the local officer appointed formerly by the sheriff with the sanction of the home secretary, but now by the lord advocate, whose official duties may be regarded as comprising at once those of the public prosecutor, coroner, and former grand jury of England. The P. of a co. or dist. of a co. is, in fact, the proper person to take the initiative in cases of sudden death or death under circumstances of suspicion, and not only to conduct a post-mortem examination, but generally to carry out all the various preliminary duties that precede the actual trial before a jury.

Procyon (a Canis Minoris) is the lesser dog-star, magnitude 0.48; its spectrum intermediate between those of the sun and Sirius. Bessel determined its proper motion and announced its binary nature in 1896. Schaeberle detected the companion, magnitude 13, emitting about $\frac{1}{25000}$ the solar light, and of over one-half the solar mass. Auwers found (1862) a period of forty years. It has been well studied. Parallax 0.30" gives a distance of eleven light years; speed at right angles to line of sight, 12 m. per sec.; approaching the sun at 3 m. per sec.

Prodicus (c. 480-400 B.C.), (Gk. sophist of the time of Socrates, b. at Iulis in Ceos. He lectured at Athens and elsewhere, among his pupils being Isocrates and Euripides. He wrote *The Choice of Hercules*.

Producer Gas, see GAS MANUFACTURE, *Gas for Fuel or Power*.

Production and Productivity. The term production was originally used in the limited sense of making of goods, and is still so applied in everyday life. Modern economic theory has extended the meaning of the term, applying it to all activities which increase the opportunities for consumption, i.e. it includes not only the making of goods but also their distribution, in short it is defined as the creation of wealth. The distinction is important since the modern theory shows that there is no justification for the differentiation between 'productive' and 'unproductive' work, the latter referring to distribution and services, since the making of goods is not the end of economic activity. Another distinction should also be borne in mind, i.e. production may either mean the actual process of making goods ('production will be started') or the result of this process ('the volume of production').

Production in the limited sense may be individual, batch, or mass production. Individual production still prevails where high craftsmanship and individual finish is required (e.g. bespoke tailoring, handicrafts, etc.). Factory production normally requires that at least a series of

similar products is made ('batch' production). Mass production (q.v.) seeks to make the best use of tools and machinery by a continuous flow of standardised production. Modern methods of production have made possible the steadily rising standard of living in the W. world over the last hundred years. It is now generally realised that industrialisation and the introduction of modern production techniques is necessary in order to improve conditions in the 'undeveloped' countries.

It is the task of economic policy to see that production keeps up with the demand for goods. If too many goods are produced they cannot be sold, production will be decreased and workers lose their jobs; in other words, there is a slump. If production is not big enough to satisfy demand, 'too much money will chase too few goods,' and there is inflationary pressure. The private manufacturer is guided in his production plans by the prospect for profits; in nationalised industries the same considerations must apply if permanent deficits are to be avoided. Production can be restricted by employers to keep prices high, or by trade unions to keep the jobs safe; there was no room for such practices in Britain's post-war economy.

Productivity, indicating the efficiency of production, is measured as production per man-hour, man-day, or man-year. The most reliable indication of productivity is production per man-hour, since production per man-day and man-year is influenced by changes in working hours and duration of holidays. The larger the production per man-hour, the greater the productivity. Productivity may be increased by greater effort on the part of the worker, by better arrangement of the individual operations in the factory, or by increased mechanisation and rationalisation. Productivity as well as production can be increased by the incentive of higher earnings (payment by piece instead of time); they are decreased by high and progressive taxation, especially higher rates for overtime. For increased productivity there may be special bonuses, or public commendation and special awards (as in Soviet Russia). In Britain it was realised during the 1939-45 war that increased productivity depended on the willing co-operation of the workers. Productivity councils in factories, composed of employers and workers, seek to find the best ways for increasing productivity. The development councils set up by the Board of Trade for a number of industries also deal with this problem. The Anglo-Amer. Productivity Council, a voluntary body set up by the industry in the two countries, fosters with the help of the Economic Co-operation Administration exchange of information on productivity methods, mainly by visits to U.S.A. See L. Rostas, *Comparative Productivity in British and American Industry*, 1949.

Production, Census of. The Board of Trade takes a C of P. at intervals to ascertain the total amount of industrial productions (gross output) in the United Kingdom; the value of materials, fuel, and

electricity used in production, and cost of work given out; the difference between these amounts, which is the value added in production to materials, etc. (net output); the number of persons employed in production; and other cognate information. These aggregates are analysed to show the results for individual industries or groups of industries, geographical areas, etc. Finished products of one firm frequently form the materials of another, as there is substantial duplication in the total gross output of all firms, but relatively much less within a single industry. This duplication is automatically eliminated from net output, and the duplication in gross output has been estimated for most of the censuses.

The first C. of P. was taken in the United Kingdom for 1907 under powers given by the Census of Production Act, 1906, which strictly defined the questions which might be asked. The second census, for 1912, was interrupted by war and never completed. Later censuses under the 1906 Act were taken in 1924, 1930, and 1935. The Import Duties Act, 1932, and Finance Act, 1933, authorised more detailed inquiries into the production of certain classes of goods. Five such inquiries were held between 1933 and 1939, that for 1935 supplementing the C. of P. for that year. In 1946 a partial census was taken under Defence Regulations. The Statistics of Trade Act, 1947, provided for a C. of P. every year and gave powers enabling full inquiry to be made into the economic factors of production. The first ann. census was taken for 1948.

C. of P. returns are required from factories and workshops, mines and quarries, building undertakings, public utilities, and gov. depts. In 1907 and 1924 all such undertakings made full returns, but at other completed censuses estabs. employing ten persons or fewer were exempt. The 1907 census extended to the whole of Ireland, while reports for 1924, 1930, and 1935 included particulars for N. Ireland. The 1948 census was confined to Great Britain.

Summary particulars for the first four completed censuses were as follows (the figures representing millions of pounds):

Year	Gross Output	Materials and Work Done	Net Output*
1907	1765	1033	697
1924	3747	2106	1518
1930	3371	1789	1504
1935	3565	1876	1625

* After deducting excise duties.

The following table compares the gross and net output for 1924 and 1935 in the main groups of industries, viz.: A. *Factory Trades*. (1) Engineering, shipbuilding, and vehicles; (2) food, drink, and tobacco; (3) textiles; (4) iron and steel; (5) paper, printing, and stationery; (6) other factory trades. B. *Non-factory Trades*. (7) Public utility services; (8) mines

and quarries; (9) building and contracting. The figures represent millions of pounds.

Trade Group	Gross Output		Net Output	
	1924	1935	1924	1935
A. (1)	402	491	198	249
(2)	670	664	172	202
(3)	763	446	222	158
(4)	295	281	99	116
(5)	162	184	94	112
(6)	734	771	291	345
Total A.	3026	2837	1076	1182
B. (7)	225	313	145	185
(8)	273	167	226	137
(9)	163	216	81	100
Total B.*	721	728	472	443
All Trades	3747	3565	1518	1625

* Including gov. depts.

In 1935 there were employed on the average 5,137,600 persons in factory trades and 2,147,900 in non-factory trades. In addition to these there were estimated to be 826,700 persons employed by 204,151 small firms who each employed ten persons or fewer. The number of estabs. in factory trades employing more than ten persons was 48,944.

A full analysis of the results of these C. of P. has been pub. in the respective final reports.

Production, Ministry of, gov. dept. set up on behalf of the War Cabinet, in 1942. The minister of P. was appointed to carry out all the duties previously exercised by the production executive set up early in 1941, excepting those relating to manpower and labour, which were transferred to the Ministry of Labour. His duties included the allocation of available resources of productive capacity and raw materials (including arrangements for their importation) and the settlement of priorities. He also exercised supervision and guidance of the various depts. concerned with production, but not so as to affect the responsibility of the ministers in charge of these depts. The M. of P. also handled, on behalf of the War Cabinet, discussions in the combined bodies set up in England and the U.S.A. to deal with munitions assignments and raw materials as between the Allies. It organised, in co-operation with the dominions and other empire govts., the general planning of raw materials, machine tools, and munitions of the empire. The first minister was Lord Beaverbrook. In 1945 the M. of P. was merged with the Board of Trade.

Professional, see under LAWYERS.

Professor. Among the Romans this term was applied to certain public teachers. In medieval univs. it signified the possessor of a licence to teach, and

was practically synonymous with 'doctor' or 'master.' Such licence was then the only degree granted to students, but later a separate class of recognised lecturers sprang up, to whom the title of P. was applied. The univ. authorities appoint most Ps., but the regius Ps. at the older univs. are chosen by the Crown.

Profit and Loss Account, see under BOOK-KEEPING, Private Ledger.

Profit à Prendre, right, profit, or benefit enjoyed over the land of another, e.g. rights of common, tithes, rent service. A P. & P. is to be distinguished from an easement in that the latter is in the nature of a mere convenience or privilege without profit, while the former gives the owner of it a right to something of substance. See also COMMON RIGHT OF.

Profiteering. It is impracticable to pay for modern war by the proceeds of taxation and savings; and belligerent govts., in order to pay their way, have to borrow from the banking system, thus causing the creation of bank-money (demand deposits) and of currency to supplement it. The First World War thus saw the creation of huge quantities of money while, at the same time, the requirements of total war meant that only a minimum of labour could be spared to produce the goods and services on which the citizen was used to spend his money. Moreover war imposes new patterns of trade and puts its own restrictions on freedom of competition. In the United Kingdom the result, in spite of some price-fixing, was a steep rise in prices, a rise that continued in post-war conditions until, with relaxed controls, the peak of inflation was reached in 1920, in which year wholesale prices were treble pre-war. The public saw the rapidly mounting prices and failed to appreciate how largely they were due to inflation. The temptation to put the blame on the shopkeeper or his supplier was irresistible. 'Profiteering' and 'profiteer' (contrasting with 'volunteer') became well-worn terms of abuse to denote the imposition of unfair prices and those responsible for them, the makers of undue profits. To say that monetary inflation was the great cause of the high prices is not to say that no one took advantage of the scarcity of goods and the plenitude of money to make undue gains, whether on consumer goods or in gov. contracting. In the summer of 1919 public concern at rising prices had put the 'Profiteering' Act, 1919, on the statute book. This gave the Board of Trade powers to investigate prices, costs, and profits at all levels, and the assistance of central and local committees, with appeal tribunals.

P. remains as a word of abuse for overcharging or alleged overcharging in general: but the Second World War brought no outburst of protestation comparable to that of the first. There was substantial reason for this. Experience in the First World War was put to good account, and early in the Second World War the Prices of Goods Act, 1939, was passed 'to prevent the price of goods . . . specified by the Board of Trade being raised above the

basic price . . . by more than an amount referable to increases in . . . specified expenses,' and giving the board powers to specify basic prices, permitted increases, and permitted prices. Central and local price-regulation committees were set up; and still function. The Act was extended and amended by the Goods and Services (Price Control) Act, 1941, which covered 'services in relation to goods' and gave the board power not only to fix maximum prices but to prescribe the marking of goods. Food prices were controlled under Defence Regulations authority, and basic foods, moreover, were heavily subsidised. Despite these thorough-going measures the Second World War was not conducted without inflation. The Board of Trade index shows a rise of 66.7 per cent over 1938 for the year 1945, with further rises to 72.7 per cent, 89.1 per cent, and 116.2 per cent in the years 1946-1948. But these are wholesale prices, and the cost-of-living figures, thanks largely to the food subsidies, are markedly lower—only 31 per cent above pre-war (Sept. 1, 1939) for each of the three years 1945-47. (The 1947 figure is for the part-year only; to June. A new 'Interim Index' shows that retail prices rose by one-tenth in the following twelve months.)

It is one of the advantages of a period of relatively stable prices that they tend to become traditional, people feeling that certain prices are inherently 'right' for certain things: so that they will not pay more without sustained protest. The tides of inflation wash away the well-known landmarks, the sense of money values becomes blurred and lost, and the citizen making the occasional as distinct from the habitual purchase has often no notion of even approximate current price. Such conditions invite overcharging. See also PRICE.

Profits. Gross P. for the economist as distinct from the accountant are receipts minus (ordinary) costs; while there is general agreement that this residue must be broken down to isolate the element of 'pure' profit, there is considerable divergence of opinion as to how this should be done. One main view is that profit is the reward of risk-bearing; another that it is the remuneration for such *entrepreneur* services as planning, organising, integrating the factors of production, etc. These services tend to be rewarded, like risk-bearing, from the residue left after contractual payments have been met; although nowadays the tendency is to remunerate more and more services by fixed payments, and accordingly from this angle to narrow the field of pure profit. But in so far as we eliminate contract payments actually made in the larger firm we must make parallel adjustments for the smaller firm where the *entrepreneur* supplies his own capital and runs his own business; assigning him a notional salary as 'wages of management' and a further part of gross P. as pure interest, or rather as debenture interest. Adam Smith was the first to distinguish the interest element in P.: 'The revenue derived . . . from stock [capital], by the person who

manages or employs it, is called profit. That derived from it by the person who does not employ it himself, but lends it to another, is called the interest or the use of money. Part of that profit naturally belongs to the borrower, who runs the risk and takes the trouble of employing it; and part to the lender, who affords him the opportunity of making this profit.' Smith also saw that the interest charge included an element of insurance against capital loss. Classical economists developed the analysis of gross profit and, with J. S. Mill, there was a clear division of P. into (1) interest, (2) payment for risk, and (3) wages of management or superintendence. Marshall added the service of combining or integrating the factors of production; and later Marshall, like J. B. Clark, came to regard profit as the product of (unforeseen) change, a product which is seen as non-existent in hypothetical conditions of perfect competition with freedom of supply and demand. While pure profit is very far from non-existent to-day it is often negative for particular firms over varying periods, and there is even doubt whether total pure profit is not negative. (F. A. Walker held that just as there is marginal no-rent land, so there is a class of no-profit *entrepreneurs*.)

Although interest may be segregated from profit, both depend on the earning power of capital, and in practice people invest indifferently in the interest-earning debenture or the dividend-earning share according to which is thought likely to yield the better income, having regard to varying risks and prospects.

Profit-sharing, see **SHARING OF PROFITS**.

Prognathism, term describing the degree of projection of the upper jaw in man and apes. It is calculated in sev. ways, one being the angle made by the jaw to a line joining chin to forehead. The projection is greatest in apes and least in Europeans, the Negro type being called prognathous, and the European type orthognathous.

Prognosis (Uk. *prognosis*, knowledge beforehand). In the medical world, a forecast of the probably course, duration, and effect of any disease or injury. An opinion on the nature of the disease however is a diagnosis.

Programme Music, term applied to music which is not absolute or abstract but descriptive of something outside itself. The earliest composers attempted musical descriptions of actions and events, and the reproduction of sounds of nature, as, for example, in the battle and weather pieces of Elizabethan virginalists. A less crude type of P. M. began with the symphonies of Berlioz and the symphonic poems of Liszt, in which emotional and psychological description is more important than representation of physical action.

Progreso, chief port of Yucatan, Mexico, on the N. coast, 25 m. N. of Merida. There are numerous salt lagoons. The main industry in the area served by the port is the cultivation of hennequin (sisal hemp). Pop. 15,000.

Progression, see **ARITHMETICAL, GEOMETRIC, AND HARMONICAL PROGRESSION**.

Progressive Party, see **BULL MOOSE**.

Prohibition, prerogative writ (*q.v.*) directed to the judge and parties to a suit in an inferior court, commanding them not to go on with it, on the ground either that the court has no jurisdiction in the matter, or that the proceedings are vitiated by reason of some other irregularity.

Prohibition, in the sense of laws forbidding the sale of intoxicating liquors, is an Amer. conception which afterwards spread to a few other countries like Finland and Norway. The P. movement in the U.S.A. originated in Maine, where, after a vigorous campaign by Neal Dow, the legislature passed an Act in 1846 forbidding the sale of spirits. In 1851 the legislature passed a further law prohibiting all kinds of alcoholic drinks. By 1855 various full or partial P. laws had been adopted by all the New England states, as well as by some of the states of the N. and middle-W. belt. But in some of these commonwealths the courts declared the laws unconstitutional, and in others they were allowed to become a dead letter. In the eighties the movement was revived, and Kansas became a 'bone-dry' state. In 1898 the Anti-Saloon League was formed, with headquarters in Ohio. It was backed by influential men in the Methodist, Baptist, and Presbyterian Churches. It also became more scientific than the first would-be reformers. Prohibitionists now demanded the insertion of P. amendments in the constitutions of the various states, with result that the state courts would not be able to declare P. laws illegal.

The liquor interests of the country, which paid a gigantic revenue to the Federal Treasury, at first did not take this campaign seriously, but they soon found cause for alarm. Amer. public opinion, especially in the country dists. and in the smaller towns and vills., was forming against them. Even in the cities the people resented the growing domination of the saloon-keepers and the liquor interests in political affairs, by dint of their control of ward, municipal, and state political machines. In the country in general large employers of labour became convinced that the free selling of liquor was a bad thing. In the S. states the question was associated with the problem of Negro crimes against white women. S. leaders felt that if gin could be kept away from the lower type of Negro, there would be less crime. Many states which declined to pass state-wide P. laws adopted a form of local option. Under this a city or a tn. or a co. could vote itself dry. The entry of the U.S.A. into the First World War gave the dry movement enormous impetus. In order to save cereals that could be used for food, Congress enacted laws prohibiting first the manu. of spirits and, later, of beers and wines. These laws were only for the duration of the war. But the reformers said that what was good for war was good for peace. Congress quickly responded to this sentiment, and by Dec. 1917 it had passed a proposed P. amendment to the constitution through

both houses by the required two-thirds majority. The law, as passed by Congress, provided that the ratification by the necessary three-fourths of the states, should take place within seven years, and that the enactment should come into force a year after its ratification. Within a very short time three-fourths of the states adopted the amendment. In fact, all but two did—Connecticut and Rhode Is. The amendment became operative Jan. 16, 1920. Before this it was necessary for Congress to pass a law defining what was meant by the term 'intoxicating liquors' as used in the amendment. Congress passed this Act in Oct. 1919. It was known as the Volstead Act, after Congressman Volstead, who introduced it.

The Act provided that alcohol, brandy, whisky, rum, gin, beer, ale, porter, wine, and other beverages containing one-half of 1 per cent of alcohol or more should come within the ban of the law. To manuf., transport, import, export, or sell or barter such was illegal. President Wilson vetoed this Bill, but it was passed over his veto Oct. 28, 1919, by 176 to 55 votes in the House of Representatives and by 63 to 20 in the Senate. The Jones law passed in 1929 to tighten up the prosecution of offenders provided that habitual violators of the law should be fined a sum not exceeding \$10,000 or imprisoned for a term not exceeding five years. Most of the states passed enactments for the enforcement of these Federal laws. By these enactments the U.S. Gov. gave up many millions in revenue it formerly secured from the distillers and brewers. But P. brought no real advantages in those dists. where a majority or a large minority of the people were opposed to the principle, though temperance leaders claimed that the benefits of P. were far greater than the evils to which it gave rise. The law was one which could not be adequately enforced in the large cities. The 'bootleggers,' as the illicit vendors were called, soon came into existence, supplying liquor to those who required it. Scotch whisky, largely shipped to Brit. is, in the W. Indies and to the Fr. is. of St. Pierre and Miquelon, off the Canadian mainland, was the spirit chiefly supplied. This was smuggled into the U.S.A. by means of swift motor-boats which effected landings at various places on the long coastline. There were many cases of death, blindness, and paralysis, caused by people drinking 'Scotch whisky' which was made out of wood alcohol. Even the real Scotch whisky was 'cut'—that is, diluted with more or less harmless ingredients, even water. Gin was made synthetically. Wine was made by securing grape juice from California. But an even more sinister effect of the dry laws was the struggle which went on between gangsters for control of ter. in the big cities where they delivered their bootleg drinks to customers. This led to a contest for mastery between gangs, backed up by their criminal gunmen who did not hesitate to murder, and the forces of law and order seemed helpless. New York,

Chicago, Detroit, and other big cities all had their share of this. 'Speak-easies,' places where one might buy dubious drinks at exaggerated prices, were common in all the big cities. The commission of famous lawyers named by President Hoover and headed by George Wickersham to inquire into the questions of law enforcement in the U.S.A. brought in a report favouring the continuation of the 'great experiment' of P., but this was largely nullified by the individual reports made by most of the members. The data of the U.S.A. Dept. of Justice show that over 51 per cent of all the cases heard in the Federal courts in 1930 were for violations of the liquor laws. Just as the question of slavery became the bone of contention in the irrepressible conflict which led to the Civil war, so P. threatened to become a great political question in the U.S.A. It was to the fore in the presidential election of 1928, but although the country dists. were still actively dry in 1930, many of the large cities were becoming ardently in favour of repealing the P. amendment. Finally by the twenty-first amendment, Dec. 5, 1933, the eighteenth or liquor P. of 1919 was repealed. As a result, each state enjoyed complete home rule in the matter of liquor laws. Some states, e.g. Oklahoma, where Baptist and other Church groups were strongly prohibitionist, remained 'dry.' The 'dryness,' however, was modified by the fact that the Federal law was amended to define as 'non-intoxicating' liquors containing less than 32 per cent of alcohol. The sale of weak beer thus became permissible even in 'dry' states.

Experiments in P. have been made and abandoned in Ireland, Finland, Norway, and in certain provs. of Canada. In the case of Ireland and Finland the abandonment was due to economic pressure by wine-exporting countries. In the matter of control, schemes of local option have been more successful. In Britain, the movement made little impression, yet from 1922 to 1931 Edwin Scrymgeour sat as prohibitionist M.P. for Dundee. Prince Edward Is. adopted P. in 1900 and adhered to the policy until 1947. The Maori ter. in New Zealand (known as the King Country) maintains P. as do the Indian reservations in U.S.A. and Canada. The grant of dominion status to India and Pakistan was followed by the adoption of P. on a large scale. The gov. of India estab. P. in its own prov. of Delhi and encouraged the prov. govts. to follow its example; the provs. of Bombay and Madras were the first to take action and the policy is being gradually adopted in other provs. The Pakistan Gov. enacted a P. law which applied only to Muslims, but the Punjab High Court ruled that such legislation was unconstitutional and that if P. was to be introduced it must apply to all citizens irrespective of race or religion. In both India and Pakistan the P. movement received great impetus from the fact that it accords with the religious teaching of the prin. religions of the two countries.

See II. R. Curlewis and D. S. Edwards,

Prohibition, 1910, and R. E. Hose, Prohibition or Control: Canada's Experience with the Liquor Problem, 1929.

Projectile. The term is applied to a body which describes a free path through the atmosphere, and the name trajectory is applied to the path. Before considering the general case of Ps. a few simple formulae which are used for bodies rising or falling vertically should be understood. If u is the velocity with which a body is thrown vertically, s its distance from the place of projection after a time t sec., and v the velocity with which it is then moving, the following formulae are used: $v = u + ft$, $s = ut + \frac{1}{2}gt^2$, $v^2 = u^2 + 2gs$, where g denotes the increase of velocity each second and is measured in ft. per sec. or in cm. per sec. in the c.g.s. system. It is usual to take g as an acceleration of 32 ft. per sec. each sec., and this is written in the form $g = 32 \text{ ft./sec.}^2$ or 32 ft. sec.^{-2} . When g acts in a direction opposite to that in which the body is thrown, the - sign must be given to 32 before substitution in the above equations; when

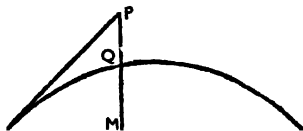


FIG. 1

it acts in the same direction the + sign is given, and a well-known example of the latter is the case where a stone is thrown vertically downwards from the top of a cliff. From these simple formulae it is easy to proceed to the case of Ps. in which the original velocities are not vertical but inclined at any angle to the horizon. Ignoring the resistance of the atmosphere first of all and taking u as before for the original velocity of the body along the line OP (Fig. 1), where OP is inclined at an angle α to the horizon, the horizontal component of this velocity is $u \cos \alpha$ and the vertical component is $u \sin \alpha$. The former remains the same throughout the flight of the body, but the latter decreases until the P. reaches the highest point of its trajectory, when it vanishes and then it starts to increase, the motion now being towards the earth. Each velocity can be treated independently and the formulae given above are applicable to the vertical motion of the body, $u \sin \alpha$ being substituted for u . Suppose we want to find the time that the P. takes to reach the earth, reckoning from the instant at the beginning of its flight, then as its height above the surface of the earth at the end of its flight is zero, by making $s = 0$ in the second equation, $t = (2u \sin \alpha)/g$. During this time t the body is moving horizontally with a velocity $u \cos \alpha$, and hence the total horizontal distance R of flight is $u \cos \alpha \times (2u \sin \alpha)/g = (2u^2 \sin \alpha \cos \alpha)/g = \frac{u^2}{g} \sin 2\alpha$. It is assumed that the beginning and end of the trajectory are

in the same horizontal plane; if not, that is, if at the end of its path the body struck an elevation or depression, the equation would require modification, but it is unnecessary to consider this case.

From $R = \frac{u^2}{g} \sin 2\alpha$, $\sin 2\alpha = gr/u^2$, and from

this it is seen that there are two angles of elevation which give the same horizontal range R . Thus if $\alpha = \pi/4 + \theta$ or $\pi/4 - \theta$, $\sin 2\alpha$ in each case is $\cos \theta$, and a body projected at two angles to the horizon, one as much below 45° as the other is above 45° , will have the same horizontal range, although their trajectories are different. (Guns can thus strike objects with two elevations, one giving a low trajectory and the other a trajectory for high angle bombardment. The maximum value for the sine of an angle is 1, and hence the maximum horizontal range for a projectile is u^2/g , obtained by making $2\alpha = 90^\circ$, or $\alpha = 45^\circ$, which shows that the maximum horizontal range of a P. occurs when α is 45° . To find the greatest height attained it is obvious that when this occurs the body has no vertical velocity, and hence $u \sin \alpha$ is substituted for u and 0 for v in the third equation, from which the expression $s = (u^2 \sin^2 \alpha)/2g$ is easily derived. If α is 45° $s = u^2/4g$, which shows that the maximum range of a trajectory is four times the distance of its highest point above the earth. The following considerations will show that the path of a P. is a parabola. If a point Q be taken anywhere on the trajectory and the co-ordinates of Q be (x, y) (in Fig. 1 these are OM and MQ, respectively, and are referred to axes through O, the x -axis being horizontal and lying in the plane of the trajectory, the y -axis being perpendicular to OQ and also lying in the plane of the trajectory), then $x = ut \cos \alpha$, $y = ut \sin \alpha - \frac{1}{2}gt^2$, from which we obtain by eliminating t , $y = x \tan \alpha - \frac{gx^2}{2u^2 \cos^2 \alpha}$, which is a parabola. An interesting result is obtained by eliminating t instead of x in the above equations. In this case it is easily seen that $x^2 + (y + \frac{1}{2}gt^2)^2 = u^2 t^2$ ($\cos^2 \alpha + \sin^2 \alpha = 1$), which is the equation of a circle. This shows that if a number of bodies be started off from O with velocity u at different angles to the horizon but all in the same vertical plane, after a time t they will be found on a circle of radius ut with its centre at the point $(0, -\frac{1}{2}gt^2)$, that is, with the centre at a point vertically below O at a distance equal to that through which a body falls in t sec.

Owing to atmospheric resistance the paths of Ps. are not exact parabolas, and the greater the initial velocity the more the trajectory departs from a parabola. Extensive experiments have been carried out for many years to determine the true paths of Ps. with various velocities and different shapes but this subject is too vast to be dealt with in a short article. Rev. F. Bashforth's work with the electric chronograph (1865-70) showed that the resistance of the atmosphere varies considerably according to the velocity. Between 900 and 1100 ft./sec. the resistance

varies as v^3 , between 1100 and 1350 ft./sec. it varies as v^2 , and above 1350 ft./sec. as v . With more recent experiments more modern tables than those of Bashforth have been constructed for the use of gunners. The ballistic coefficient C is very important in compiling tables, and standard trajectories for any particular weapon can be computed only when appropriate values of C are known. It is then necessary to fire at various angles of elevation, and then suitable tables can be derived. In addition to the ordinary resistance of the atmosphere account must be taken of the direction of the wind and also of the 'drift,' owing to the gyroscopic action produced by the rotation of the Pa. A rough illustration of three trajectories

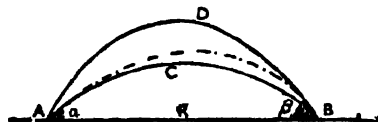


FIG. 2

is shown in Fig. 2. C and D are two trajectories produced by two angles of elevation, one exceeding 45° by the same amount as the other is less than 45° . The broken line shows the real trajectory when atmospheric resistance is taken into account. See *Reports on Experiments made with the Bashforth Chronograph to determine the Resistance of the Air to the Motion of Projectiles*, 1870; F. Bashforth, *Motion of Projectiles*, 1872; *The Bashforth Chronograph*, 1890, and *Theory of Projectiles*, 1903; F. R. Moulton, *New Methods in Exterior Ballistics*, 1926; J. Kent, 'Projectile Design' in *Mechanical Engineering*, 1932; T. J. Hayes, *Elements of Ordnance*, 1938. For a full explanation of the drifting of Pa. see H. Crabtree, *An Elementary Treatment of the Theory of Spinning Tops and Gyroscopic Motion*, 1914, Appendix. iii.

Projection, see under MAPS.

Projection Tests, see under PSYCHOLOGY.

Prokofiev, Sergei Sergeievich (b. 1891), Russian composer, b. at Ekaterinoslav. He studied under Liadov, Witkol, Rimsky-Korsakov, and Anna Lisipova, at St. Petersburg Conservatoire. He won the Rubinstein prize for his first piano concerto. In 1918 he left Russia, living in Britain, France, Japan, and the U.S.A. before returning to Russia in 1934. The Soviet authorities insisted that he should popularise his music. In 1948, however, it was felt that he had not carried this far enough, and he was accused of showing 'an individualism intolerable to Soviet society.' His efforts at more popular and sympathetic music can be seen in such works as *Peter and the Wolf*, the overture *Toast to Stalin*, and the film music for *Ivan the Terrible* and *Alexander Nevsky*. His operas include *Loves of the Three Oranges*, *The Gambler* (after Dostoevsky's novel), and *War and Peace* (after Tolstoy's novel). He has also written music for ballet, four symphonies, two

violin and sev. piano concertos, and some piano pieces. His music in his earlier years was distinguished by its hard brilliance; his later works showing a mellowing and maturity of style. See L. L. Sabaneev, *Modern Russian Composers*, 1927, and study by J. V. Nestyer, 1947.

Prokop, Andreas (1380-1431), Hussite leader, b. in Bohemia. He became a monk, and travelled widely in Europe. He joined Ziska's army when the Hussite war began, and after Ziska's death in 1424 P. became the Taborite leader. He was a master of strategy, and won a number of notable victories over superior forces of Gers., Austrians, and Saxons. By 1427 he held Prague and controlled Bohemia, and his followers then began a series of aggressive raids into enemy ter. But P.'s radical social beliefs turned the nobility against him, and in 1434 he was killed at the battle of Lipan by an army led by Bohemian nobles. See Count von Lutzow, *The Hussite Wars in Bohemia*, 1914.

Proletariat or Proletariate, poorer classes of the community. The term *proletarius* was applied by Servius Tullius to the lowest ranks, as being only useful to rear offspring (*proles*). During the twentieth century it has frequently been used to denote the wage-earning class. See SOCIALISM.

Prologue, introduction to a play, poem, or discourse. Aristotle applies the term to that part of a tragedy preceding the *parodos*, or first speech of the chorus. It should be a mere address to the public.

Prome, dist. of Lower Burma, in Pegu div., with an area of 2914 sq. m. The chief tn., P., stands on the Irrawaddy, 161 m. by rail N.N.W. of Rangoon. The manuf. of ornamental boxes, paper, and silk-weaving are carried on. P. fell to the Jap. invaders after the road between it and Rangoon was cut (March 1942). It was liberated by Brit. troops in May 1945. Pop. of dist. 436,700; of tn. 28,300.

Promenade Concerts. Special type of popular orchestral concert, cultivated especially at the London Queen's Hall from 1895 until its destruction in 1941, under the direction of Sir Henry Wood, and continued at the Albert Hall. The programmes gradually improved until they contained all the best orchestral music and modern novelties, and a special feature is that the floor of the hall is left bare for people to stand, not to walk about, for which they have neither room nor inclination. P. C. were not new to London in 1895; they were started by P. Musard at Drury Lane in 1840 and by Louis Jullien at Covent Garden about the same time.

Prometheus (Gk. Προμηθεΐς, 'Forethought'), in Gk. legend, son of the Titan Iapetus, father of Deucalion. The stories of his attempt to cheat Zeus in offering a sacrifice to him, of his stealing fire from heaven for man, and of his warning Epimetheus against receiving Pandora as a gift from Zeus are well known. He is generally taken as a type of culture-hero, the earliest teacher and benefactor

of mankind. Zeus punished his presumption by sending an eagle to devour his liver, which was daily renewed, but finally he was set free by Heracles. See Hesiod, *Theogony*, 521-616; *Works and Days*, 54-105; Æschylus, *Prometheus Vinctus*; P. B. Shelley, *Prometheus Unbound*; monographs by B. G. Welske, 1842, E. v. Lasaulx, 1843; A. Milohhofer, 1882; E. B. Tylor, *Early History of Mankind*, 1865; and F. F. A. Kuhn, *Die Herabkunft des Feuers*, 1886.

Prominences. At the time of a total eclipse of the sun scarlet projections known as P. are seen in various places along the sun's limb. They assume different forms—clouds, fountains, etc., and it is remarkable how often they resemble some of the extinct reptiles of the Jurassic period. These great tongues of flame consist of incandescent gases which extend 30,000 m. and often much



Harvard University Climax Station
SOLAR PROMINENCE

Large eruptive prominence, June 4, 1946

more from the sun. More than sixty years ago Janssen and Lockyer independently thought of an apparatus which would show them when there was no eclipse and within comparatively recent times they have been filmed by a special method. On the screen they present an awe-inspiring sight, the enormous tongues rising from the sun and moving out tens of thousands of miles, then falling back on its surface. In some cases they maintain their positions for a time but in others they change very rapidly. Quiescent P. often reach very large dimensions and remain suspended above the sun's chromosphere for weeks or even months and seem able to float for days without much change in form, in spite of the sun's gravity. Eruptive P. appear with the suddenness of an explosion and often change their forms so rapidly that in a few minutes after the eruption commences they are very conspicuous. Measurements of their velocities have shown that these sometimes attain nearly 200 m. per sec. A new instrument known as the spectrohelioscope (q.v.), invented by Hale of Mt. Wilson Observatory, is now extensively used to study P. Closely connected with P. are solar 'flares' which have been studied extensively in England by W. H. Newton,

Royal Observatory, Greenwich. These are short-lived patches of luminosity which appear in disturbed regions of the sun and which interfere with short-wave radio transmissions. About twenty hours later magnetic storms are sometimes in evidence, or a display of the aurora. The real reason for 'flares' still awaits an explanation.

Promissory Note, unconditional promise in writing, signed by the promisor, to pay on demand, or at a fixed or ascertainable future time, a definite sum of money to, or to the order of, a named person or to bearer (see also NEGOTIABLE INSTRUMENTS). No form of words is essential, but an instrument promising to do anything in addition to the payment of money is not a P. N. A bank note is a P. N. issued by a banker and payable to bearer on demand. An IOU (q.v.), if it contains a promise to pay, may constitute a valid P. N. Where a P. N. runs 'I promise to pay,' but is signed by two or more persons, it is a joint and sev. note, i.e. the makers are both jointly and separately liable on it.

Promotion, in the R.N., army, and R.A.F., see under RANK.

Promoter, Company, see COMPANY AND COMPANY LAW, *Promoter*.

Prongbuck, see ANTLOCAPRA.

Proof, in law, means the estab. to the satisfaction of a judge or jury by oral or documentary evidence of the facts alleged in the pleadings (q.v.), though it is also used to denote relevant as opposed to irrelevant evidence (see EVIDENCE). In legal slang it is the recognised term for the written or typed evidence of witnesses, prepared by the solicitor for the use of counsel so that the latter may know what a witness is going to be called to prove.

Proof, Burden of, see ONUS PROBANDI.

Proof Reader, or **Printer's Reader**, or **Corrector of the Press**, one engaged in the work of proof-reading (q.v.), and who plays an important part in a modern printing office. He usually possesses a good general and technical education and is required not only to detect omissions, literal and typographical errors, but must draw attention to errors of fact, ambiguous statements, and libellous remarks, and ensure that the work is free from errors and inconsistencies. In recent years large printing houses have recognised the reader's aptitude for copy preparation. This work is done before setting the type and the reader attends to details of house style (see PROOF-READING), and eliminates technical and general queries so that setting may proceed without interruption.

In London printing offices readers must pass an entrance examination to the Association for the Correctors of the Press, and in the provs. the Typographical Association stipulate trade qualifications. The Prov. Guild of Printers' Readers also has an examining body.

Proof-reading, business of reading through printers' proofs to discover errors for correction. In the early days of print, when type was set by hand, it was

In Proof	In Margin	Meaning
/	g	Delete.
h	a	Insert letter 'a.'
—	ital	Set in italics.
=	S.C.	Set in small capitals.
≡	caps	Set in capitals.
-	W.F.	Wrong fount.
↵	trs	Transpose words marked.
/	g	Turn letter right way up.
/	a/e	Substitute letters.
/	l.c	Substitute lower case.
h	y	Add letter 'y.'
h	#	Insert space.
	Lead	Delete lead between lines.
/	↓	Push down 'space.'
LLL	eq#	Equalise space between words.
⊂	⊂	Close up.
/	⊙	Substitute punctuation marked.
LL	(p)	Parentheses to be inserted.
LL	—	Em rule to be inserted.
=	x	Battered letter.
[N	Commence new paragraph.
2	run on	Continue on same line.
F		Range start of lines.
.....	stet	Let it stand.
↵	trs	Transpose to caret mark
==	==	Correct bad alignment.

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PROOF-READING MARKS

customary to correct errors during composition, but since the introduction of mechanical composition the rate of production has increased considerably and it has become necessary to employ trained proof readers (q.v.).

P. marks, illustrated in adjoining column, together with queries to the author, editor, or publisher, are made in the margins of slip or page proof. Reading is done at all stages of composition as follows: *First proof*, on galley proof when the reader must ensure that the matter set conforms to copy and is in accordance with instructions of publisher and author. *Make-up* entails revision of first proof and checking page length, headlines, footnotes, etc. *Press reading* in most printing houses is done after the proofs have been passed by the author so that the press reader, who is responsible for the final correctness of work, can be guided by the author's remarks and instructions. Some printers, however, prefer press reading to be done before proofs are submitted to the author. After the compositor has corrected the type according to the marks made the work is *press revised* and corrections then made are checked on the *machine revise*, which is a proof pulled when the work is sent to the machine for the reader to examine the edges of the pages for type broken in transit to machine. *Foundry revising* is a check of corrections before making a stereo-plate. *Author's revise* is the revising of the author's marks after correction by the compositor.

Newspaper printing is of necessity a speedy process, and the P. is done by the employment of an assistant or copy-holder reading the copy aloud to the reader, who is thus saved the time of comparing proof and copy. This method is also used by general printers for straightforward copy, but it is always necessary to compare technical and complicated matter.

In order to maintain a uniform style in pubs., some printers and publishers set out their preferences in word formations, spellings, capitalisation, and hyphenated and non-hyphenated words, in the form of a house style which forms part of the instructions to the printer and assists the proof reader in avoiding inconsistencies. A well-equipped reference library is essential to a modern P. dept. and should contain Eng., Fr., and Ger. dictionaries, dictionaries of technical, scientific, medical, and musical terms, a gazetteer, a good encyclopedia, biographical dictionary, H. Collins, *Authors' and Printers' Dictionary* (1946), and H. W. Fowler, *Dictionary of Modern English Usage* (1937), or E. Partridge, *Usage and Abusage* (1947).

Proof Spirit, as defined by Act of Parliament, is such a spirit as shall at a temp. of 51° F. weigh exactly twelve-thirtieths of an equal measure of distilled water. It contains 57.06 per cent by volume or 49.24 per cent by weight of absolute alcohol. Spirits are termed 'under' or 'over' proof, according as they are stronger or weaker than P. S. Thus 25°

over proof means that 100 volumes of the spirit diluted with water would yield 125 volumes of P. S., whilst 20° under proof means that 100 volumes of the sample contain 80 volumes of P. S.

Propaganda (*De propaganda Fide*), name of a Rom. Congregation founded by Gregory XV. in 1622 to regulate eccles. affairs in countries where a Rom. Catholic hierarchy either does not exist or is not fully estab.

Propaganda, art of propagating and instilling a belief, particularly a religious or political belief. The word P. is derived from the Congregatio de Propaganda Fide (see above). P. has been used by individuals and organisations since, as far as can be judged, the evolution of organised society; but since the growth of literacy and the invention of wireless and films it has acquired much greater importance. It was used by belligerents in both world wars. Lord Northcliffe's organisation at Crewe House, London, greatly assisted in the collapse of the Hapsburg Empire, by publicising the claims to self-government of various nationalities within it. P. need not necessarily entail the elimination of one set of ideas and the substitution of another, in peacetime. The Brit. Council aims at the peaceful propagation of Brit. culture, while appreciating the value of the cultures of other nations. Gustave Le Bon was the first to treat systematically the fact that P. was a branch of psychology, especially mass-psychology (1895). His study has since been much elaborated and the conclusions aptly learned, especially by the govs. of totalitarian states.

P. may attempt to instil the truth; but since 1918 the word has acquired a normally derogatory and sinister sense, owing to the P. methods of Fascist and Communist states. P. makes use of books, pamphlets, newspapers, radio, songs, slogans, films, festivals, and organised religion. While, during the Second World War Brit. P. was largely based on the maxim that unadulterated facts, plainly presented, ultimately produced the most lasting effect on their audience, all countries involved made use of the emotional appeal. In the U.S.A. this frequently entailed a certain glorification of war, such as the nation-wide tours made by Hollywood film stars, advocating the desirability of buying defence bonds to aid the war effort. P. by any party or state necessarily means a marked stress on the value of the idea which it is wished to impart. P. is therefore strictly more than information, even though the Brit. Gov. dept. for disseminating P. during the Second World War was named the Ministry of Information (q.v.). In Germany, under the direction of Goebbels (q.v.) P. really ceased to have any reliable informative value and became simply the science of moulding opinion to a given belief, by any means available. Emphasis on those who had died for the cause had been an instrument of P. from early times; examples include the early Christian martyrs, the religious martyrs of the Reformation, and twentieth-

century figures such as Edith Cavell (q.v.), and Rosa Luxemburg (q.v.). Goebbels made the recognition of Horst Wessel and other Nazi heroes and martyrs nothing less than a religious cult in which the object of veneration took on a super-human significance. Such treatment may be compared with the public exhibition of the embalmed body of Lenin in the Red Square, Moscow, by the Soviet authorities. Goebbels employed any lie or distortion of fact to suit his purpose, working on the principle that if a thing was stated sufficiently emphatically and frequently it would be believed. His policy achieved a remarkable degree of success in Germany itself, though in countries where there was access to other sources of information it had little efficacy. Similar P. methods, and the same policy of sealing off other sources of information, appear to be practised to varying degrees in Communist states. See G. Le Bon, *Psychologie des foules*, 1895; W. F. Trotter, *Instincts of the Herd in Peace and War*, 1916; Sir C. Stewart, *Secrets of Crewe House*, 1920; E. Stern-Rubarth, *Propaganda as a Political Instrument*, 1921; Lord Ponsonby, *Lies and Falsehood in Wartime*, 1930; Lt. S. Lambert, *Propaganda*, 1938; A. Sturmingen, *Politische Propaganda in der Weltgeschichte*, 1938; E. H. Carr, *Propaganda in International Politics* (1939); F. C. Bartlett, *Political Parties*, 1940; E. Freeman, *Conquering the Man in the Street*, 1940; J. Hargrave, *Words Win Wars: Propaganda the Mightiest Weapon of All*, 1940; and P. Quentin, *La Propagande politique*, 1943.

Propagation of Plants, see PLANTS.

Propeller or Air-screw, see SCREW-PROPELLER.

Proper Motion, angular motion in secs. of arc per annum through which any particular star appears to move relatively to the whole stellar universe. The apparent motion is compounded of the real motion of the star, relative to the other stars, and the motion of the sun in space, and the latter must be eliminated to give the proper motion. This can be done when the star's distance is known. The fact that some stars possess a P. M., shows that the stars are not infinitely far away, otherwise their motion could not be observed. When P. Ms. are large this may indicate that the motions are rapid or that the stars are comparatively close, or both. P. Ms. provide statistical information regarding the distances of the stars, but not of individual stars. When a star's distance is known its P. M. gives its velocity in m. or kms. a sec., at right angles to our line of sight, that is, its tangential or transverse velocity. Its radial velocity—that is, its velocity in a direction to or from the earth—is found by the spectroscopic.

Propertius, S. Aulus Aurelius (c. 50–16 B.C.), Rom. elegiac poet, b. at Assisium (Assisi), Umbria, of a well-to-do family. After the battle of Philippi his patrimony was confiscated, but he received a good education and afterwards settled in Rome. Here he became deeply attached to the

famous 'Cynthia,' a courtesan of Tibur. After her death, however, nothing is known of his life. He is said to have had many literary friends in the circle of Maecenas, including Tibullus, Ovid, and Horace. His extant poems consist of four books of about 4000 lines of elegiac verse. Though his work is unequal in quality, no Rom. poet except Catullus so forcibly described the passion of love. His poems are mostly concerned with Cynthia, but the fourth deals with Rom. legend and hist. He was a student of Gk. and Lat. predecessors and was influenced by Virgil, Horace, and other contemporaries, and his own influence on the latter is also evident, especially upon Ovid. A trans. of his poems by H. E. Butler appeared in 1912.

Property. P. is either the exclusive right of possessing, enjoying, and disposing of a thing (i.e. ownership as opposed to possession, *q.v.*), or, by extension, the subjects of such exclusive right. The fundamental div. of P. (in the latter sense) in Eng. law, and indeed in most legal systems, though with a varying nomenclature, is into: (1) Things real, consisting of (a) *corporeal* or *immovable* property, i.e. lands, tenements, and hereditaments, and (b) the rights and profits annexed to and issuing out of these, or *incorporeal* property, i.e. rents, annuities, tithes, franchises, (*q.v.*), common rights, advowsons, etc. (see also LAND LAWS, and REAL PROPERTY); and (2) things personal, consisting of goods, money, and other movables. See also CHATTELS; CHOSE IN ACTION; PERSONALTY; PERSONAL PROPERTY; TENURE, LAND. For Scots analogues, see HERITABLE AND MOVEABLE, HERITABLE SECURITY.

Prophecy (Gk. *προφητεία*, feminine *προφήτις*), means 'forth-telling,' and not 'foretelling' or 'future-telling,' which in Greece was done by the *μάντις*. The term prophet thus means 'interpreter' or 'spokesman,' one who speaks for God or for any deity, as the inspired revealer or interpreter of his will. The common belief that a prophet is primarily one who forecasts future events is, therefore, inaccurate. Christian (*haramata*) are generally considered as corresponding to Heb. prophecies. **Muslim prophecy:** Adam is the first of the prophets, Mohammed the last one, and Jesus Christ the last but one.

Hebrew prophecy: Ant. Heb. had three words for prophet, *nābhī'*, *rōhē*, and *hōsch*. While the last two words may conveniently be trans. as 'seer, visionary, gazer,' etc., the exact meaning, origin, and semantics of *nābhī'*, the main term for prophet, are still uncertain. In the historical development of Heb. P. two main periods may be distinguished, i.e. the earlier one, of which very little is known, terminating in the middle eighth century B.C., and the following period, which may be considered as the golden age of P. Moses is defined by Jewish tradition as the greatest prophet in Israel (Deut. xxxiv. 10). In the days of the judges (twelfth century B.C.), Deborah and Samuel were pre-eminent; Nathan, Ahijah, Shema'yah, Elijah, and

Elisha are the main prophetic figures of the early kings (eleventh to ninth century B.C.). P., however, springs from simple, even crude beginnings. In the days of Saul and David (eleventh century B.C.), with a few exceptions, the prophets seem to have been rather like wild dervishes (1 Sam. x. 5). As time went on, P. began to change its character and function. Of the second period more information is supplied, namely by the books of the prophets themselves, which now are part of the Bible; Amos and Hosea of the N. kingdom (eighth century B.C.); Isaiah, Micah (eighth century B.C.), Zephaniah, Nahum (seventh century B.C.), Habakkuk, Jeremiah, Ezekiel (sixth century B.C.), in Judah. While very little is known about the activity of Joel, Obadiah, and Jonah, Haggai, Zechariah, Malachi (fifth-fourth century B.C.) are the last representatives of these spokesmen for God and humanity.

It should be borne in mind that nothing is known about the prophetic books or their authors except what can be gathered from the books themselves, carefully studied in the light of the other books of the Bible, of the contemporary hist. of other nations, and of comparative philology, sociology, and religion. While scholars agree that the prophets lived in the above indicated periods, the dates and authorship of various chapters or sections of the prophetic books are the subjects of much controversy. For instance, the book of Isaiah is divided by some scholars into three sections, of which only the first one is attributed to the prophet Isaiah. Chs. xl.-lv., known as second or Deutero-Isaiah, are attributed to an anonymous prophet of the middle sixth century B.C. ('No writer of the Old Testament expresses more clearly than Deutero-Isaiah the idea of absolute monotheism,' W. L. Wardle), and the concluding chs. (lvi.-lxvi.), known as Trito-Isaiah, are even considered as the composition of various authors, and are assigned by some scholars to as late as the third century B.C. The recent discovery, among the 'Dead Sea Scrolls' of two copies of Isaiah (of which one is complete), by some scholars assigned to the second century B.C., provides evidence against the exaggerated theories.

The Heb. prophets, whose words are still vibrant with the plea for social organisation and justice, and for religious reverence, and still able to reveal the holiness and loving-kindness of God, remain unique in their majesty. No exact parallel has yet been discovered, although some scholars have tried to show that there was something analogous in Egypt or in Phoenicia or elsewhere. These great men never saw themselves as having any part in the divine. Their greatness consists first of all in their conception of what God's will was. At the same time, they never worked miracles; they kept their feet always on the ground, their eyes always on human life, their interest directed only to improve it, never themselves. They suffered and endured to create a better world. Jewish ethical

monotheism and also Christianity owe very much to these great figures. See W. R. Smith, *Prophecy of Israel*, 2nd ed., 1896; A. B. Davidson, *Old Testament Prophecy*, 1903; E. Sellin, *Alt Testament Prophetismus*, 1912; G. Holscher, *Die Propheten*, 1914; M. Buttenweiser, *Prophecy of Israel*, 1914; A. R. Gordon, *Prophecy of the Old Testament*, 1916; H. Gunkel, *Die Propheten*, 1917; J. M. Gray, *A Text-book on Prophecy*, 1919; W. A. O. Allen, *Old Testament Prophecy*, 1919; E. Tobac, *Les Prophètes d'Israël*, I., 1919, 1932, II.-III., 1921; T. H. Robinson, *Prophecy and the Prophets*, 1923; R. O. Gille, *The Story of the Hebrew Prophets*, 1923; H. M. Wiener, *Prophecy of Israel*, 1923; J. M. P. Smith, *The Prophets and their Times*, 1925; M. Micklem, *Prophecy and Eschatology*, 1926; H. Junker, *Propheze und Seher in Israel*, 1927; J. Darmsteter, *Les Prophètes d'Israël*, 1931; J. Chaine, *Introduction à la lecture des prophètes*, 1932; E. Hamilton, *The Prophets of Israel*, 1936; and A. Lods, *Des prophètes à Jésus*, 1937.

Prophylaxis, term for measures taken for prevention of disease.

Propionic Acid ($C_2H_3O_2$), fatty acid occurring in crude pyroligneous acid, and prepared by the oxidation of propyl alcohol with chromic acid. It is a pungent-smelling liquid miscible with water (boiling point $141^\circ C$).

Propolis, see BEE.

Propontis, see MARMORA, SEA OF.

Proportion may be defined as an equality existing between two equal ratios. The ratio between two quantities of the same kind is the relation which the one quantity bears to the other, the one being a multiple or part of the other. The ratio of a to b is expressed $a : b$. P may then be

expressed $a : b = c : d$ or $\frac{a}{b} = \frac{c}{d}$. Sev. results may be deduced from this definition: (1)

$ad = bc$; (2) $\frac{a}{b} = \frac{c}{d} = \frac{a+c}{b+d} = \frac{a-c}{b-d}$. A proportion may exist between three quantities a, b, c of the same kind $\frac{a}{b} = \frac{b}{c}$. When a series of quantities a, b, c, d, e, \dots have the property $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = \frac{d}{e} = \dots$ these quantities are said to be in continued P . If three quantities are in continued P , $\frac{a}{b} = \frac{b}{c}$ then $ac = b^2$, and then b is called the mean proportional between a and c , and c is called the third proportional. The introduction of incommensurable numbers has rendered the above arithmetic definition inexact, in that these numbers cannot be exactly measured in terms of some common unit. Euclid introduced in his geometry a more rigorous definition which embraces the treatment of both commensurable and incommensurable, but it is of rather a too complex character to be very practicable.

Proportional Representation, system of voting in elections where the elector

votes for the candidates not by putting a cross against their names, but by using numbers to indicate his order of preference. This system is generally known as that of the 'single transferable vote.' In an alternative system, candidates are elected according to party lists, and votes given to a party in any constituency not sufficient for the election of a candidate are reserved for a second scrutiny, in which these 'remainder votes' are added up. If the total is sufficient for the election of one or more candidates, they are taken from a national list of their party presented in addition to the local lists, and become members of parliament without a constituency. $P. R.$ involves an intricate system of counting, but it is claimed that the disadvantages attaching to minorities who feel themselves excluded from their legitimate share in the government of their country are lessened by the scheme. There are many systems in different towns and countries; that operating in Tasmania is as follows. Tasmania is divided into five electoral dists., each forming one political constituency being represented by six members. The elector indicates his choice by writing the figures 1, 2, 3, 4, 5, 6 against six names he wishes to elect in the order of preferences indicated by his use of the figures. In the first count first preferences alone are counted, and any candidate who receives the quota of first preferences is elected, the quota being fixed by the formula

$$\frac{\text{number of ballot papers}}{\text{number of candidates to be elected} + 1}$$

The excess ballot papers of the candidate receiving the quota are recounted and given to the candidates who receive the second preference votes. The method is continued to the third preference and so on. This is known as the single transferable vote system, and is the one advocated by the Brit. $P. R.$ Society. Other systems are: (1) The alternative vote system, in which the voter marks the candidates names in order of preference on the ballot-paper. The names at the bottom are then eliminated in turn, the voters' second choices being distributed among the other candidates. This system is in use in Australian states and was used in Brit. univ. constituencies. (2) The second ballot system. If no candidate receives an absolute majority, a second vote is held to decide between the leading two candidates. (3) The system under which electors vote on a party list. Should a party not receive enough votes in one constituency to gain a successful candidate, its votes are retained for a second scrutiny, when representation in proportion to its total number of votes is granted to it. In Great Britain the Liberal party supports $P. R.$ $P. R.$ applies for elections to the houses of laity and clergy in the Church of England, and was formerly used in Brit. univ. constituencies. It applies in Eire, in many continental countries, including France, Belgium, and Italy, and, to some

extent, in S. Africa, New Zealand, and Canada (for some municipal elections). Where sev. parties exist, P. R. ensures a hearing for minority opinions; but opponents of the system point to some continental examples as proof that it prevents effective functioning of government. See G. Horwill, *Proportional Representation*, 1925; H. F. Gosnell, *Proportional Representation*, 1931; H. H. Schötkhin, *Die Auswirkungen des Proportionalwahlverfahrens auf Wählerschaft und Parlament*, 1946.

Propylæum (Gk. προπυλαίον), in architecture, entrance gateway or vestibule forming an entrance to a temple or similar sacred enclosure, so treated as to form an important architectural feature. The propylæa of the Acropolis at Athens are especially famous.

Propyl Alcohol (normal), or Ethyl Carbinol ($\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$), one of the important constituents of fusel oil, from which it is prepared by fractional distillation. It is a colourless liquid (b.p. 97°C ; sp. gr. 0.8 at 20°), miscible with water. Isopropyl alcohol, or dimethyl carbinol ($(\text{CH}_3)_2\text{CHOH}$), is an isomer which boils at 82° . It is used as a solvent for essential oils in the perfume industry, and in many industrial processes it can be employed as a substitute for the more expensive ethyl alcohol. It is made commercially as a by-product of the petroleum industry; propylene, C_3H_6 , is obtained by cracking petroleum and is then absorbed in sulphuric acid. On diluting the product with water and distilling, isopropyl alcohol distils over.

Prorogation, as applied to parl. procedure, means the interruption of a session of both houses and its continuance in the succeeding session as opposed to an adjournment. The effect is to suspend all business until Parliament is summoned again, whereas an adjournment, which may be of either one or both houses, is merely a matter of ordinary convenience. A public Bill must be renewed after a P., however short, as if it had never been introduced. Impeachments and appeals to the House of Lords are not affected by a P. P. at the close of a session is effected either by the royal command through the lord chancellor in the presence of the sovereign, or by commission; but if Parliament be already prorogued to a fixed date a further P. can only be effected by proclamation. See also PARLIAMENT.

Prose, written expression of thought without, as in verse, any attempt at metrical form. P. and verse (*q.v.*) are the two prin. divs. of literature. In the hist. of every literature poetry preceded P. partly because literature in early times required a capacity for memorableness and partly because no one troubled to write down the speech of everyday use until such time as speech became organised in the form of oratory. In classical times the art of P. is closely allied with rhetoric; and even historians, such as Thucydides, often used the form of *oratio recta*. P. then was studied as carefully as verse, with a view to declamation, and as the spoken quality of P.

is a measure of its success, the definition of Aristotle cannot be bettered—that P. 'must neither possess metre nor be without rhythm' (*Rhetoric*, III. viii. 1). Gk. P. set a high standard with such names as Thucydides, Plato, and Xenophon. Great Rom. P. writers include Cicero, Sallust, and Livy. The last named introduced tricks of style which later influenced Macaulay. European P. as a literary medium was late in starting. No old Fr. literary P. goes back much before 1100, and Fr., It., and Ger. P. reaches maturity only with the Renaissance and the Reformation; but A.-S. P. of good style exists from as early as the seventh century, and Middle Eng. P. from the twelfth to the fourteenth century. Fifteenth-century narrative P. reaches excellence with Malory and Berners, while Malory's publisher, Caxton, worked conscientiously towards the raising of the standard of Eng. P. Conscious rhetoric in P. continued, leading, if the exorcism of euphuism is set aside, to the ornateness of Elizabethan P. and the Book of Common Prayer, and to the rhythm of the A. V. of the Bible, the importance of which cannot be over-emphasised in marking the development of Eng. P. from a narrative to a philosophic instrument. But contemporary with the P. of Milton, Jeremy Taylor, and Sir Thomas Browne, Dryden was writing down the speech of the educated seventeenth-century Eng. gentleman whose habit happened to be good P. This plain Augustan P. of the seventeenth and eighteenth centuries was, however, lifted into a grand style, different from that of the Elizabethans, first by Gibbon, then by Johnson and Burke, leading to the Georgian P. of Southey. Nineteenth-century P. is varied. The elaborate style was practised by De Quincey and Landor, and among their direct successors stand Ruskin and Kingsley, Pater, and also Swinburne and Morris, not forgetting the exquisite P. of Newman. Morris was the exponent of 'Wardour Street' Eng.—excellent for his particular purposes. In the early twentieth century P. tended to disintegrate. This was due partly to the lapse of the family habit of reading aloud, and partly to the popularity of the novel, with consequent eye-reading and no ear accompaniment. While the attempts of certain authors to avoid the time element in P. resulted in a controlled incoherence, other writers sustained the high quality of Eng. P., which since the 1930s has achieved an increasingly high level. This revival may be partly due to the increased popularity of radio, where P. readings have brought back an interest in good P., and partly to the high standard set by such writers as Winston Churchill, Lord David Cecil, Charles Morgan, Rosemond Leumann, and Rose Macaulay. Amer. P. has developed similarly in the twentieth century, attaining possibly a higher average level than Eng. P., but failing to produce such outstanding individual examples. See G. Saintsbury, *A History of English Prose Rhythm*, 1912; Sir A.

Quiller-Couch, *The Art of Writing*, 1916, 1946; H. Read, *English Prose Style*, 1928; J. B. Priestley, *The English Novel*, 1931, 1935; G. V. James, *The Art of the Novel*, 1935; L. Heriger, *Poesie und Prosa*, 1943; R. A. Liddell, *A Treatise on the Novel*, 1947; E. Muir, *The Structure of the Novel*, 1947; H. James, *The Art of Fiction and other Essays*, 1948; and F. Mosby and J. K. Thomas, *Advanced Prose Interpretation*, 1948.



M. Ludovisi

PLUTO AND PROSERPINE

Prosecution, see CRIMINAL LAW.

Prosecution, Malicious, see MALICIOUS PROSECUTION.

Proselytes (from Gk.), converts, especially to Jewish faith. Anct. and Rabbinic Judaism did not deprecate the admission of converts. Indeed, genuine P. were welcomed and highly esteemed. The Talmudic law mentions two classes of P., the *ger eved*, 'P. of righteousness' (who fully embraced the Jewish religion and were admitted to the enjoyments of all its rites and ordinances), and *ger toshab*, originally a gentile who settled in Palestine and, to obtain the privilege of citizenship, abjured idolatry (these P. conformed in some respects to the Jewish religion, but were allowed only limited privileges). In the early years of the Rom. Empire many Rom. citizens of high rank became P.; and in the eighth century A.D. a large tribe of Tatars, the Khazars, are believed to have been converts to Judaism and to have estab. a Jewish kingdom in

S. Russia, which was destroyed by the Russians in the tenth century.

Proserpine, or **Persephone** (Gk. Περσεφόνη), in Gk. mythology daughter of Zeus and Demeter. She was carried off by Pluto, king of the underworld or Hades, who made her his wife, but Demeter, in revenge, refused to allow any fruits of the earth to grow; thus men would have died of hunger had not Zeus intervened and persuaded Pluto to let P. go. It was eventually arranged that she should spend two-thirds (or one-half) of the year with her mother and the rest with her husband Pluto.

Proskurov, tn. of the Ukrainian S.S.R., 56 m. N.E. of Kamenets-Podolsk, with an export trade in corn and sugar. Agriculture and market-gardening are the chief industries, but there are also oil-works and potteries. Pop. 40,600.

Prosody (Gk. προσωδία), science of versification; that part of the study of language which deals with the forms of metrical composition, including as its two divs. accent and quantities of syllables. See METRE; RHYME; RHYTHM; VERSE.

Prosopoeia (Gk. προσωποποιία, lit. face-making), impersonation, or embodiment of some quality or abstraction. Often a figure by which an imaginary or absent person is represented as speaking or acting.

Prospecting, see under MINING.

Prospectus, see COMPANY AND COMPANY LAW, *Prospectus*.

Prostate Gland, large gland, or each of a number of small glands, accessory to the male generative organs. It surrounds the neck of the bladder and the commencement of the urethra in man and other mammalia. In man it is approximately 1½ in. broad and secretes an important factor of the spermiatic fluid. Prostatitis, or inflammation of the P. G. is frequently caused by gonorrhoea and sterility may result. The P. G. is subject to cancer, and sometimes has to be surgically removed. In older men fibrous tissue in the P. G. may impede the flow of urine.

Prostitution, sexual intercourse for the sake of gain on the part of a woman. In early civilisations P. was of religious origin and connected with fertility rites, but soon became a means of profit and exploitation. Promiscuity and P. in themselves are evils which can only be checked by educational means and by the gradual acceptance by all nations of high standards of personal and public morality, and by equal moral responsibility being accepted by both sexes for their actions.

The prostitute has, on the whole, been accepted for many years, even during the Christian era, as a 'necessary evil.' This conception is based on a mistaken and now largely discredited belief in the biological necessity of extra-marital sexual intercourse for most males. It has resulted in incalculable physical and spiritual degradation, both individual and national. With few exceptions the prostitute in all ages has been treated as outside the protection of the law and has suffered persecution and exploitation and often physical injury. Shakespeare through King Lear

says: 'Thou rascal beadle, hold thy bloody hand. Why dost thou lash that whore? Strip thine own back. Thou hotly lusts to use her in that wise for which thou whippst her.' He touches the heart of the problem.

In many countries legislation is directed against prostitutes but not against their clients. The Brit. system of moral legislation is designed to protect the young and the helpless against abuse, to prevent public indecency and all kinds of exploitation, and to provide adequate punishment for such offences, but does not include in the category of crime acts of personal and private immorality between mutually consenting adults.

In Great Britain under three Acts of the early nineteenth century, prostitutes are forbidden to solicit to the annoyance of other persons, but this regulation applies to no other women. Prostitutes are also the only persons unprotected by law against sexual exploitation by means of fraud or misrepresentation. Licensees under the Licensing Acts are subject to penalties if they knowingly permit their premises to be the habitual resort of prostitutes. Many legal anomalies exist because of these laws, and present-day conditions demand a careful overhaul of their provisions. Legislation regarding the crimes of procuration and defilement is contained in the Criminal Law Amendment Act of 1885 and later Amendments of 1912 and 1922. The age of consent to carnal knowledge is sixteen years. Brothel keepers, procurers, and men living on the immoral earnings of others, can be punished. On the whole this legislation is successful in punishing and preventing much exploitation of immorality, though it also needs reconsideration.

Practical help for women and girls who wish to leave a life of promiscuity or P. has been for many years the concern of religious and other welfare organisations and is now the subject of international study. Consideration of the problem of male promiscuity, however, lags behind but is nevertheless of urgent importance. Of recent years much has been done to save young girls from P., notably in Great Britain through the Children and Young Persons Act of 1933, which provides for the protection of young people under the age of seventeen in moral danger or in need of care and protection. The recent Children's Act of 1948 gives further power to the state to protect the young. The most callous method of attempting control of P. and its concomitant, venereal disease, is the system of state regulation of P. This system was devised in Napoleonic times and spread rapidly over Europe and to other parts of the world. Briefly, it provides that women who are prostitutes or suspected prostitutes must be on a police register, or live in state-regulated brothels (*maisons tolérées*) and be medically examined for venereal disease at regular intervals with or without their consent. If infected, the woman is detained in hospital till cured, and then returned to her 'work'. If found uninfected, she is given a card marked to that

effect. Under this system, women have no legal status or control over their own bodies, and are completely under the control of the 'morals police' (*police des mœurs*). Their clients are entirely free from all examination or supervision.

An Eng. woman, Josephine Butler, began a campaign in 1864 with the help of famous men and women of many countries, to expose the evils and fallacies of this system. She founded the Association for Moral and Social Hygiene in Great Britain and the International Abolitionist Federation abroad, and was a foundation member of the National Vigilance Association. The facts of the degradation of men and women and of youth, the corruption of officials, the medical absurdity of examination of women only, the false sense of physical security which encouraged and multiplied the use of prostitutes, and finally the proof that the state-regulated brothel inevitably involved the existence of traffickers and *souteneurs* to provide women and girls for the brothels, were gradually realised, and many countries have abandoned the system entirely. France closed the state-regulated brothels in 1946 (though not entirely removing the system). Italy is in process of closing them, and in Europe only Spain and Portugal keep the original system.

Since 1904 many nations have worked together to overcome the scourge of the third-party exploiter and trafficker, and have adopted international conventions, each one further extending protection to actual or possible victims of exploitation and providing for the punishment of the offenders. The League of Nations in 1927 undertook an intensive survey into the problem, which proved beyond all doubt that state regulation of P. encouraged the traffic, and that the traffickers were exceedingly rich and powerful and the network widespread. The United Nations continued the work of the League, and the Fifth Convention for the suppression of the traffic in persons and of the exploitation of the P. of others was in Dec. 1949 adopted by the General Assembly. If this convention is signed and ratified by the majority of nations, it will protect all persons, male or female, of any age, in any country, against any form of exploitation or P., with or without their consent, and will punish those who profit by the immorality of others.

Other conventions concerning obscene pubs, and narcotic drugs, both closely connected with the traffic, have been adopted in the past, and are still under consideration by the Economic and Social Council of the United Nations. The educational and preventive aspect of the problem of sexual immorality, and the danger this brings to the stability of family life, is the subject of careful study by the United Nations, and much information is being collected. The United Nations has granted consultative status to certain non-governmental organisations in this and other fields of work. Among those specially concerned with the problems of P. and traffic in women and children are

the International Bureau for the Suppression of Traffic in Women and Children; the International Abolitionist Federation; the International Council of Women; Fédération Internationale des Amies de la Jeune Fille; Association Catholique Internationale des Œuvres de Protection de la Jeune Fille; Union Internationale des Ligues Féminine Catholique; World Y.W.C.A.; Liaison Committee of Women's International Organisations; World Alliance of Y.M.C.A.; International Alliance of Women; St. Joan's Social and Political Alliance.

A new inquiry into traffic in persons in the Far E. has been contemplated. The appointment of women police in Great Britain and a number of other countries has been of great assistance in the care and protection of women and young people and in preserving order and decency in the streets. In Great Britain men and women have the same duties and powers, but women police are, of course, especially helpful in the questioning and care of women and girl victims or offenders.

The social conscience of men and women, and hence of govs. all over the world, is becoming wide awake to the evils of promiscuity and P. and their stimulation and exploitation by powerful vested interests. Not only cure but prevention is being sought, and no factor is being neglected, either economic, social, or spiritual, national or international. See also VIGILANCE SOCIETIES.

Protagoras (Πρωταγόρας) (c. 480-411 B.C.), Gk. philosopher, b. at Abdera. He was especially celebrated for his skill in the rhetorical art.

Proteaceae, family of trees and shrubs, valuable for timber, found chiefly in Australasia and S. Africa. The prin. genera are *Protea*, *Grevillea*, *Bankisia*, etc.

Protection, in its narrow meaning, is the imposition of a customs duty to impede the entry of foreign goods which compete with home production. In its wider meaning it covers all devices, other than efficiency measures, designed to protect or expand a country's trade and industry (including shipping, banking, and all other services). P. again may be regarded as any practice outside the free trade (*laissez-faire*) doctrine that trade should be free to find its own levels, i.e. that it is to the interest of each and every nation that trade should be uncontrolled by tariffs, bounties, quotas, or similar restrictive arrangements.

The Free Trade case is that to maximise the world's wealth it is necessary to let the principle of specialisation operate to the fullest extent and that this is only possible if all barriers to trade are swept away. Including barriers to the movement of men and capital. Under conditions of unrestricted competition the free-trader sees an ideal pattern of world trade. Wherever a trade or an industry is estab. he knows it to be situated in the best possible place, having regard to natural resources, supply of suitable labour and proximity to markets; its less efficient competitors, necessarily charging a higher price, having

been forced out of business. As conditions change, owing to public taste, inventions, discoveries, improved transport, etc., estab. firms and industries may lose their competitive advantage, yield place to others, and have to turn to alternative employment. Everywhere only the lowest-cost firms will remain in business, and a lowest-cost highest-efficiency world is a world of maximum wealth, permitting the highest standards of living. Since Free Trade gives this ideal pattern of trade and industry it follows that any interference with freedom to trade, any measure of P., must distort the ideal pattern, i.e. must reduce the field of maximum efficiency and wealth. The Free Trade argument applies not only to the world as a whole, but to any part. While the Free Trade country in a protectionist world cannot hope for maximum prosperity, yet freedom of trade on its part will give it the best possible trade pattern in the circumstances, the highest standard of living possible in a misguided world. The foreigner's tariff against cheap goods worsens the pattern of world trade; he harms himself and his supplier; but further tariffs can only make matters worse. The protectionist world for reasons of its own restricts world trade by shutting out cheap imports; that is no reason why the Free Trade country should restrict trade still further and refuse to take the utmost advantage of cheap production abroad.

While Free Trade theory is attractive, the fact that P. is practised on all hands suggests that the Free Trade case may have its flaws. Free Trade in theory at least seems admirably designed to produce the last ounce of efficiency and extract the last ounce of wealth from the world's resources; but it may be objected that the world to-day is less concerned with a system of trade that allows the minor inefficiency of the worker achieving something less than maximum production and more concerned to have a system which shall eliminate the gross inefficiency of the worker over long periods, producing nothing at all. Unemployment and its elimination is the outstanding economic problem of this generation and Free Trade is likely to be judged by that test. A Gallup poll in 1949 showed an overwhelming preference for security in employment as against a higher wage. Free Trade frankly accepts the view that progress involves continual change, and that change, far from being resisted, should be met by prompt adaptation. Thus with P. ruled out, an industry driven out of its markets by foreign competition has no alternative, when wages and profits cannot be (further) reduced, but to find other kinds of employment; the skilled specialised labour must be ready to adapt itself to new trades, the factory or other capital must be adapted or scrapped. Undue resistance to change on the part of trade unions, employers' combinations, etc., may cause chronic unemployment, and is incompatible with Free Trade policy. The Free Trade country welcomes the fruits of efficiency from whatever quarter they

come, and promptly proceeds to make what adjustments are involved. If it is not prepared to adjust then Free Trade may be the worst of policies. Against the vagaries of dumping Free Trade has no defence.

In the time of Adam Smith England was much nearer perfect competition than she is to-day when trusts, unions, and combinations of all kinds render competition highly 'imperfect.' Planning, Socialist or other, everywhere replaces the 'invisible hand' of *laissez-faire*, whose benevolent efficiency transmuted, or was thought to transmute, the self-regarding interest of the individual into the general economic interest of the community. For Adam Smith the typical capitalist was the man who advanced the cost of materials and subsistence to workers engaged in home industries; and he saw little difficulty in men changing their jobs under economic pressure. To-day the contraction of one industry and the expansion of another means heavy loss both in capital and in labour skills. If the direction of change is seen as inevitable, if major efficiency is not to be sacrificed to the *status quo*, the question must nevertheless arise whether it is not worth while to try and mitigate the loss. If the decline of an industry can be slowed down, by tariffs or otherwise, the labour problem may be greatly eased, and there may be similar advantages in delaying the scrapping of capital. If, on the other hand, it is claimed that an industry must be protected permanently because there is no alternative work the general answer is that progress and efficiency involve change, and that there is always other work to turn to. Spare workers invite new enterprise. Trade, moreover, is always possible between two countries, even if, to take an extreme assumption, the one can make every type of article more cheaply; since as Ricardo showed it would be profitable (transport costs apart) for the cheaper country to let the dearer country make those things in which its inferiority was least.

The Free Trader tends to rely unduly on the principle that 'imports make exports.' After the Second World War it is clear that imports do not make exports. Since the U.S.A. has a 'chronic favourable balance of trade with the rest of the world bending its energies to secure 'scarce dollars.' It is true that after the war there are some special difficulties, but that does not mean that imports and exports balance automatically in normal times. If there was a balance in former days it was because there was machinery working to that end. If there was a balance of trade under the gold standard it was because countries with plus or minus balances each had their part to play. If the United Kingdom over-imported and paid the excess with gold instead of with goods, then there was a balance of payments; but with trade tending to a lower level. Continued payment for imports with gold instead of goods meant deflation and unemployment, leading to lower costs and so to increased exports. Protracted

opposition to wage reduction might, however, delay adjustment indefinitely. Meantime in the plus country inflation based on the extra gold was increasing imports and diminishing exports. Free exchange has its prompt balancing mechanism; but even with free exchange the dictum 'imports make exports' is only half true. An excess of imports reduces the exchange value of the pound, and so boosts exports by making them cheaper; but that is only half the effect, the other half-effect is to reduce imports by making them dearer. The protectionist may properly point out that the tariff-cum-bounty effect of free exchange spreads its benefits under Free Trade to all trades alike, whereas actual tariffs and bounties can be made to concentrate assistance on industries that most need help. The gold standard is 'cruel to be kind.' Unemployment and wage reductions are its normal agents of adjustment. Free exchange, on the other hand, allows money wages to remain intact and, besides providing free trade with a rough and ready tariff-cum-bounty, opposes no barrier to adequate (or indeed inflationary) internal spending in the cause of employment and business activity; while at the same time interposing a barrier to the dissipation of that spending abroad. The International Monetary Fund and the Havana Charter provide for adequate spending by all countries together; but meanwhile the policy of reciprocity or bilateralism, by ensuring that imports do make exports, by using imports as a bargaining counter to ensure exports, can also claim to conserve the effects of a spending policy. Bilateralism is an expression of planning, and may be achieved not only with tariffs, but notably with exchange control, quotas, gov. bulk-buying, etc. Planning marches with Socialism, but the gov. claimed (Cmd. 7572) that it had to 'embark on a system of bilateral agreements . . . to . . . counter any downwards spiral in international trade.' ('Downwards spiral' implies a tendency to balance but at lower and lower levels; it is not enough that imports and exports should balance.)

Free Traders commonly contrast the advantages of free multilateral trade with the opposite extreme of self-sufficiency. A greenhouse orange is adduced to show the folly of P. In fact, however, if free trade policy represents a country's 'ceiling' in international trade practice the 'floor' is not self-sufficiency, but a policy of reciprocal pacts which, while it may not always give the choicest and cheapest orange, will at least involve no question of a greenhouse product. Much international trade is, in fact, between neighbours or otherwise bilateral. Wider than the bilateral pact is the regional pact. A large low-tariff or Free Trade area may be seen as an approach to world free trade or as a happy mean between under- and over-specialisation. The world that made England rich was a world which gave food and raw materials for her manufs. and services: that world is shrinking: 'Empire Free Trade' or other reciprocal arrangements might arrest or modify the process.

A regional pact for W. Europe is at present (1950) under consideration.

Both the Organisation for European Economic Co-operation and the United Nations trade arrangements and proposals pay great respect to the principle that change should be suitably delayed and cushioned. That seems to be the essence of the case for the P. of committed capital and skills: to slow down and cushion necessary change, not merely because brusque methods are harsh but, having regard to the loss entailed in sudden change, in order to maximise wealth. Even where a case for maximum wealth is not fully made out some degree of P., perhaps semi-permanent, may well be called in to maximise well-being, with due regard to man's high appraisal of security. Such a policy of slowing and cushioning necessary change seems to go as far as practicable towards meeting the much-expressed demand that wages and standards of living should be (permanently) protected. To protect high costs as such would mean the greenhouse orange and the end of international specialisation. At the opposite pole from P. for decaying industries is P. for 'infant' industries, the well-known exception adumbrated by J. S. Mill and the most notable of a number of exceptional cases allowed by Free Traders. On economic grounds a new industry qualifies for P. if it has a good prospect of dispensing with P. after an initial period during which it is sheltered from the price-cutting of old-established rivals. The infant industry argument may be extended. Suppose the world adopts all-round Free Trade at a time when one particular country has estab. a marked predominance in manufs. Having regard to the difficulties incurred in establishing new industries against fierce competition, those of the rest of the world might remain predominantly agric., and extractive for a prolonged period. In these circumstances the terms of trade would be heavily in favour of the manufacturing country; so much so that the agric. and mining countries might well be substantially poorer than under a system of P. In fact, when the United Kingdom was turning to Free Trade in the first half of last century it was predominant in manuf., and there was a great expectation that the world would follow its lead. Other counsels, however, prevailed. It was, above all, Adam Smith's great Ger. critic, Friedrich List (1789-1846), who insisted that for other countries to adopt Free Trade when Eng. manuf. was predominant would pin that predominance on them indefinitely. List saw England as the man who 'kicks away the ladder by which he has climbed.' He was in no two minds about her debt to P.: 'The island kingdom borrowed from every country of the Continent its skill in special branches of industry, and planted them on English soil, under . . . protection. . . . Once possessed of any one branch of industry, England bestowed upon it sedulous care and attention, for centuries. . . . In the Middle Ages trade was regulated and over-regulated, and the mercantile system, which lasted up to the time of

Adam Smith, used tariff and prohibition to secure the precious metals through a favourable balance of trade. But it was not until after Smith had stated the classic case for Free Trade that the modern case for P. began to be formulated. The *Wealth of Nations* was pub. in 1776, and in 1791 Alexander Hamilton stated a case for P. in his *Report on Manufactures* to the U.S. Congress. List's *Outlines of a New System of Political Economy*, urging P. for native industry, was pub. in Philadelphia in 1827. He was then a refugee from Germany, where in 1841-44 he pub. his great work, *The National System of Political Economy* (quoted here). List based himself on nationality, 'the intermediate interest between . . . individualism and . . . entire humanity.' Productive power was the aim: it was a short-sighted policy to buy in the cheapest market to-day if you thereby threw away the chance of being your own manufacturer to-morrow. He considered that food and raw materials needed no P., and that Eng. manufs., fully estab. as they were, needed none either. What did call urgently for P. were the manufs. of immature countries like Germany and the U.S.A. From a report (1816) to the U.S. Congress, he cites Lord Brougham as recommending the sale of Eng. manufs. under cost 'in order to stifle in the cradle the foreign manufactures.' The great and powerful nation was one exchanging the raw produce of tropical and colonial lands against the products of her factories, and List quoted Lord Chatham's declaration that the Amer. colonies ought not to be permitted to make so much as a horse-shoe nail. At the same time he stressed the advantage of native manufs. to home agriculture.

The United Kingdom had turned definitely to Free Trade before the middle of the century; but after a period of hesitation Germany and the U.S.A. took the advice of List and the Amer. protectionist, Henry C. Carey, and instead of following suit proceeded to build up their industries behind tariff walls. Long before the end of the century Germany and the U.S.A., followed later by Japan, were making their competition keenly felt. After the early seventies exports per head, which had nearly doubled twice over since 1840-1844, began to decline, giving rise in the 1880s to the 'Fair Trade' controversy, and in 1903 to Joseph Chamberlain's Tariff Reform campaign, calling for P. and Colonial Preference. The United Kingdom could not expect to keep its early predominance for all time, but, in fact, it was not playing the free trade game. A Free Trade country must be a quick-change artist, and trade unions and employers' combinations were helping to make change a slow business. The whole trend over the last hundred years has been against flexibility—combinations of all sorts on the part of both employer and employee—and finally Socialism and planned trade. The First World War and slump of 1930-32 brought measures of P. in the United Kingdom, the slump intensifying protective measures throughout the

world. Since the Second World War there has been little talk of Free Trade and P., and much talk of multilateralism and bilateralism; and the world looks to international conferences to settle its trade affairs. Planning is the order of the day, whether socialistic or other; and no one proposes Free Trade forthwith as a cure for the present economic ills. International machinery professes to aim at freer trade, if not Free Trade, at multilateral trade as against bilateral trade; but no one suggests that *laissez-faire* (with fixed exchanges) will make imports equal exports, and the great objective of almost every nation is to balance trade. Free Trade involves an act of faith, a plunge into deep water: the nations to-day, with trade patterns distorted by war, and with memories of the ups and downs of trade even in normal times, prefer not to get out of their depth. In 1949 sev. Organisation for European Economic Co-operation countries were 'excluded on balance of payments grounds from the benefit of the United Kingdom relaxations' of quantitative control on imports. Convertibility of the £ is a step in the direction of freer trade, but its failure in 1947 served to demonstrate that it must follow, not precede, a balanced trade.

Free Trade presupposes peace. The early Free Traders saw that Free Trade would render the nations of the world interdependent and held that such interdependence would be a powerful deterrent against war. In fact, even in the absence of all-round Free Trade there was nevertheless a high degree of multilateral trade in 1914, when the outbreak of the First World War shattered the delusion that economic interdependence would prevent a general war. In a fully free-trade world specialisation would tend to go to greater and greater lengths, with greater and greater efficiency, and higher and higher standards of living; but in a world subject not only to war but also to mass unemployment such specialisation can be highly precarious. If, war apart, Free Trade to-day has a future as against P., it is because the United Nations organisation is out to remedy the great weakness of international trade; the ever-present danger that a slump in one country may be communicated to all. The United Nations aim at measures to prevent a slump in each and every country, individually and collectively. With such machinery, and a prompt willingness to accept the implications of changing conditions, something like the ideal Free Trade pattern of world trade could emerge from the distortions of war. It is another matter whether, having regard to high capitalisation and highly specialised labour skills, it would not pay the nations better to slow down the rate of accepted change. High capitalisation has its own case for P. Where high output is essential to low-cost production it is a manifest advantage, dumping apart, to have a secure home market, plus access to foreign markets.

Since post-war international conferences have shown such a high regard for the need to avoid abrupt transition it seems a

safe assumption that in fact the prospect of anything like world Free Trade is remote. In Dec. 1949 five economic experts presented to the United Nations their report, *National and International Measures for Full Employment*, on the means of implementing the United Nations' unemployment pledge. The report insists that the maintenance of full employment is vital to international trade, and recommends, *inter alia*, (1) the integration of all national trade policies; and (2) an arrangement by which a nation, heading for a slump, and reducing its imports, would, nevertheless, pay as for unreduced imports. Such a 'super-plan' as (1) is the antithesis of *laissez-faire*, and without two wars so great a departure in the course of a century could hardly have been proposed. In (2) the experts affirm that a pay-in-full-anyhow arrangement is the 'only possible way' to prevent cumulative contractions of world trade. The idea may well prove to be of the first importance for the automatic balancing of trade. The gold standard and the free exchange both have their automatic machinery for making imports equal exports, and the Bretton Woods system of fixed exchanges would have its own automatic machinery if this 'gift' idea were applied, with due safeguards, to all persistent export surpluses.

Free Trade and free enterprise are animated by the spirit of competition—P. and Socialism by the spirit of regulation and planning. Each principle has its merits, and it may be that the coming years will see an increasing acceptance of approximate demarcations between free enterprise and Socialism in the national sphere and between Free Trade and P. in the international sphere; demarcations which, subject to military and political exigencies, will give an approach in each case to the greatest common measure of advantage. See also CUSTOMS DUTIES; DUMPING; ECONOMICS; FREE TRADE; IMPERIAL PREFERENCE; MERCANTILE SYSTEM; SAFEGUARDING; TARIFF REFORM; TARIFFS; TRADE.

See A. Hamilton, *Report on Manufactures*, 1791; J. B. Byles, *Sophisms of Free Trade*, 1849; H. C. Carey, *Principles of Social Science*, 1858-59; F. List, *National System of Political Economy* (trans.), 1885; S. N. Patten, *Economic Basis of Protection*, 1890; W. J. Ashley, *The Tariff Problem*, 1901; L. S. Amery, *Fundamental Fallacies of Free Trade*, 1906; J. Grunzel, *Economic Protectionism*, 1916; W. A. S. Howins, *Trade in the Balance*, 1924; and United Nations, *National and International Measures for Full Employment*, 1949.

Protection of Ancient Buildings, Society for the, founded in 1877 by Wm. Morris, Burne-Jones, Ruskin, and other distinguished men of that generation interested in art and letters. At first their energy was directed to check the custom of restoration of anct. buildings, and particularly of churches; for at that time a reproduction of what was thought or known to have existed was held to be of greater value than the damaged original.

As years have passed, the society has become more and more one which is consulted by architects, public bodies, and private persons for advice on the preservation of old buildings of all kinds.

Protection of Ancient Monuments, Act for. This Act enables the owner of any anct. monument to which this Act applies to appoint the Commissioners of Works as guardians of such monument. The commissioners are also empowered to purchase anct. monuments, and to appoint inspectors to report on the best mode of preservation. The anct. monuments to which the Act applies will be found specified in the schedules to the Act. In England some of the most notable are Stonehenge, Old Sarum, the dolmen (Devil's Den), near Marlborough, Offington Castle, Long Meg, near Penrith, and other stone circles, Kils Culty House, and Banbury Castle. In Scotland, the Brit. walled settlement enclosing huts at Harefauils, the vitrified fort on Noth Hill, the pillars at Kilmadine, the Pictish towers at Glenelg, and the cairns at Minnigaff. In Ireland, various earthworks, cists, tumuli, cairns, and mounds in Meath, Sligo, Donegal, and Down. Provision is also made in the Town and Country Planning Acts for the safeguarding of anct. buildings and monuments.

Protective Colouring, see COLOURS OF ANIMALS.

Protector, title formerly bestowed in England upon the person to whom was entrusted the care of the kingdom during the king's minority, e.g. Lord P. Somerset during the minority of Edward VI. The Privy Council appointed such Ps. Cromwell assumed the title of Lord P. by way of analogy, though in reality he wielded the power of a monarch.

Protectorate, indefinite term denoting primarily and historically a state which being *prima facie* independent has surrendered part of its rights to the protector, the presumption being that in all other respects it remains independent. In this sense the term may be exemplified by the status of the Brit. P. of Egypt announced on Dec. 17, 1914, when the Brit. Gov. adopted all measures necessary for the defence of Egypt and the protection of its inhab. and interests, and then, in March 1922, determined its P. and declared Egypt to be a sovereign independent state. In this sense of the word, a distinction must be drawn between states under protection and those under suzerainty. A state under suzerainty is one which being part of the suzerain state has acquired certain of the attributes of international independence, the presumption being that in all other respects it remains dependent. The position of the state under suzerainty does not differ in international theory from that of an individual state in a federal system; but since the dissolution of the Holy Rom. Empire in 1806 states under suzerainty have become rare; although examples are provided by Korea, which was under the suzerainty of China until the war of 1894-95, and by Egypt when under Turkish suzerainty.

To-day, however, the term P. is gener-

ally used to describe those assumptions of limited control over, without actual occupation of, the ter. of uncivilised tribes, which are a notable feature of the modern partition of Africa. Theoretically sovereignty remained with the protected state or tribe, and the conception underlying the theory of a P. depended for its operation on the protecting power finding a strong political organisation in existence, and where, as in Bechuanaland (1890), no such conditions existed, the theory broke down. A P. in this modern sense is a kind of guardianship, frequently of a backward people by a more advanced race, and recognition of the P. relationship on the part of third states is necessary to enable the superior state to represent the protected state in its foreign relations. Complete annexation has generally followed the proclamation of a P., and mostly in the interests of the protected country. Brit. Ps. include E. and W. Aden Ps.; the strip of land, including Zanzibar, now included in the Kenya Colony and P. and formerly known as the E. African P.; Bechuanaland; Nigeria (as distinct from the colony); Nyasaland; Sierra Leone (as distinct from the colony); Somaliland; Uganda; the Brit. Solomon Is. P.; and the Brit. protected Malay states of Johore, Perak, Selangor, Negri Sembilan, Pahang, Kedah, Kelantan, Trengganu, and Perlis, now forming the greater part of the Federation of Malaya. The international status of Ps. in uncivilised regions is recognised in the sixth chapter of the general Act of the African Conference of Berlin, 1885. International law recognises the exclusive claim of the protecting state together with the correlative duty of responsibility for the security of the subjects of other states within the protected area. It is also the better opinion that native subjects of a protected area, when they are temporarily in other ter., are to be regarded as subjects of the protecting state. But in Brit. Ps. the natives are not Brit. subjects but merely 'British protected persons'; in all other respects, administrative and social, these Brit. Ps. are indistinguishable from colonies proper. Even in the most backward P. Brit. colonial policy now realises that the status of self-government should be the ultimate aim.

Where a state, though under protection, has not formally abrogated its control of foreign policy, it is not strictly a P. This was the position of San Marino, which was once under the protection of the pope and later of Italy; and, similarly, of the principality of Monaco. By a treaty of 1918 between France and Monaco, France guaranteed the political independence of Monaco, while Monaco, for her part, agreed to organise her internal economy in conformity with that of France. Inasmuch as there can be no P. without a protecting state, some jurists considered that the free ter. of Danzig before the Second World War was not a P., for though Danzig was under the protection of the League of Nations, the latter, of its nature, could not be a protecting state. Again, mandated ters. were not Ps.

In March 1939 Hitler proclaimed Bohemia and Moravia a P. of the Ger. Reich, von Neurath being made protector. This P., and others which Germany estab. in countries which she overran during the Second World War, never gained recognition by any of the allied nations, and the methods by which Germany governed them bear little resemblance to those generally recognised as signifying a P. (see above). Ps. in the sense of ex-mandated territories, are placed under United Nations' supervision through individual trusteeship agreements. Other colonial Ps. belonging to the overseas empires of the administering powers are not under such supervision. Thus Tanganyika, Fr. Cameroons, and W. Samoa are under supervision by the Trusteeship Council, but not Nigeria, Uganda, N. Rhodesia, or the Brit. Solomon Is. P. See COLONIAL TRUSTEESHIP; TRUSTEESHIP COUNCIL.

Proteins, complex organic substances forming the most important part of animal and plant cells. They consist approximately of carbon 50-55 per cent, hydrogen 6.9-7.3 per cent, nitrogen 15-19 per cent, oxygen 19-25 per cent, sulphur 0.3-5 per cent, and occasionally phosphorus. Their molecular weights are large (and for the most part uncertain), and, as a result, P. are colloidal in nature. They are (with a few exceptions) non-crystalline and insoluble in water (except to form 'colloidal solutions'). They are optically active, levorotatory. Many of them can be 'salted out' from 'solution' by the addition of salts, etc. They can be coagulated by boiling with water, and by the agency of alcohol. P. respond to several colour tests such as the *Biuret Reaction*, a test carried out in alkaline solution by the addition of copper sulphate, when a pink colour results. The *Xanthoproteic Reaction* depends on the formation of a white precipitate with nitric acid, which turns yellow on boiling, and orange when caustic soda is added. Other tests are *Millon's Reaction*, *Molisch's Test*, the *Glyoxylic Reaction*, etc. (q.v.).

P. are classified thus: (a) *Simple Proteins*: Protamines, histones, albumins, globulins, scleroproteins, glutelins, peratins, gliadins. (b) *Conjugated Proteins*: phosphoproteins, hemoproteins, nucleoproteins, mucoproteins. (c) *Protein derivatives*: peptones, peptides, proteoses, metaproteins, amino acids.

A few examples of common P. are egg-albumin, caseinogen (a phosphoprotein present in milk), haemoglobin (a conjugated protein in blood), salmin (a protamine in salmon roe), gelatin (a scleroprotein). No animal can live if P. are withdrawn from its diet. But different P. possess very different efficiencies or 'values.' These values depend on several things, e.g. ease of digestion; amount of amino acids produced, etc. In the process of digestion, the P. are split up into peptones, and these into amino acids; the products are carried away by the blood stream to the tissues, where they help to build up new tissues and replace worn-out cells. Any excess is converted by the liver into urea, which is sent to the kid-

neys for excretion. See FOOD AND FEEDING; BIOCHEMISTRY.

Proteles, see AARD-WOLF.

Proteusilaus (Πρωτεσίλαος), son of Iphiclus and Astyoche, celebrated in ant. mythology for the strong affection existing between him and his wife Laodamia (q.v.). He was the first of the Gks. to be killed by the Trojans, being the first to leap upon the Trojan coast.

Protestant Episcopal Church, Amer. episcopal church in communion with the see of Canterbury. It was introduced into Virginia on the arrival of the first Eng. colonists, in 1607. When the revolution began it had gained a foothold in almost all the colonies. It was still, however, under the jurisdiction of the bishop of London, and had no resident bishops. The movement to gather together under one constitution all the adherents of the episcopal form of government in America began in 1784, but an attempt to secure the consecration of Rev. Samuel Seabury by the Eng. bishops failed on account of some legal difficulty. The consecration was, however, carried out by the Scottish bishops. Three years later the archbishop of Canterbury consecrated Provost and White bishops of New York and Pennsylvania respectively. The P. E. C. corresponds to the Church of England in this country, and while independent of it, there is an intimate fellowship in its administration and form of service. It was founded largely through the efforts of Thomas Bray in Maryland in 1701 as a result of his work in connection with the Society for the Propagation of the Gospel in Foreign Parts. All parts of the U.S.A. are covered by its organisation. There are seventy-four dioceses, eighteen missionary dists. in the U.S.A., and eleven abroad. The government of the church is directed by a general convention which meets triennially, consisting of a House of Bishops and a House of Deputies. In 1919 a national council was formed to act during the times when the convention was not sitting. There have been considerable revisions to its Prayer Book in 1789, 1892, and 1928; but it is modelled closely on the Book of Common Prayer used in the Church of England. There are over 2,378,000 members. The office of the National Council of the P. E. C. is at 281 Fourth Avenue, New York.

Protestantism, term generally but somewhat inaccurately applied to all those who adhere to the principle of the Reformation, whatever may be the differences between them in order or doctrine. The origin of the term is this: At the second Diet of Speyer, in 1529, a decree was received from the emperor forbidding all further action in the direction of reformation until a general council should have met. The decree received the sanction of the Diet, but a solemn protest against it was made by the reformers. This protest, which was not a theological protest, but a legal and ethical one, was joined in by those princes and cities who favoured the Reformation, and hence the term came into general theological use. At first P. denoted the position of the

Lutherans as opposed to both Catholics and Zwinglians. Throughout the second half of the sixteenth century the various groups of reformers were almost as bitter towards each other as towards Rome. It was only through the calamities of the first part of the Thirty Years war (1618-1624) that they learned to unite under the common name of P. In England, until the end of the seventeenth century the term P. was opposed rather to Puritanism than to Catholicism, but since then it has remained the watchword of those who refuse obedience to Rome. See C. T. Bellamy, *History of the Reformation and Modern Protestantism*, 1895; J. P. Lilley, *Principles of Protestantism*, 1898; H. Hoffman, *Der neuere Protestantismus und die Reformation*, 1919; P. Tillich, *Protestantismus als Kritik und Gestaltung*, 1929; W. R. Inge, *Protestantism*, 1935; L. Lambinet, *Das Wesen des katholischen-protestantischen Gegensatzes*, 1946; and E. Brunner, *Christianity and Civilization*, 1947.

Proteus (Πρωτεύς), in Gk. legend, subject of Poseidon, whose flocks he tended. He was accustomed to come out of the sea at midday and recline in the shadow of the rocks with the monster of the deep around him, and if any one wanted to know about the future he had to seize him at that time. But it was necessary to be wary, for P. assumed all sorts of shapes in order to escape prophesying, but when he found all his artifices useless he resumed his proper shape and foretold the future (see Homer, *Odyssey*, iv.; Virgil, *Georgics*, iv.).

Proteus, typical genus of the family Proteidae, contains amphibians of the order Urodela (i.e. tailed forms); the three species are commonly known as olms. In length they are about one foot, and in colour they are white when in darkness, with red gill-bunches but in the light they become black. The eyes are completely covered with skin, and their habitat is confined to the subterranean waters of Carniola, Dalmatia, and Carinthia. The fore limbs end in three fingers, the hind limbs in two toes. Spawning takes place in April, and the eggs are fastened singly to stones. P. anguinus, the olm, is the best-known species.

Prothallus, **Prothallium**, or **Gametophyte**, sexual stage of ferns and other cryptogams. The spore, after germination, gradually forms the P., a small green semi-transparent, somewhat heart-shaped scale about 1 cm. in diameter, attached to the soil by root hairs. It bears on the under side a number of pimple-like projections, antheridia, or male organs, and close to the indentation of the heart a cluster of teat-shaped bodies, archegonia. These are the female organs, and each contains an egg (ovum or oosphere). Numerous minute free-moving male gametes (antherozoids or spermatozooids) are liberated from the ripe antheridia, and fertilise the eggs in the archegonia. The fertilised egg (zygote or oospore) develops into a young fern plant, which remains attached to the P. for a time.

Protoactinium, metallic chemical element of highly radioactive character; little is yet known about it. Symbol Pa, atomic number 91, atomic weight about 235.

Proto-Anatolian, Proto-Indo-European, and Proto-Indo-Hittite languages, see under **INDO-EUROPEAN LANGUAGES**.

Protocol (Gk. πρῶτος, first, and κόλλα, glue, a sheet glued to the front of a MS. and bearing an abstract of the contents and purport), rough draft or original copy of a gov. dispatch, treaty, or other document. For Geneva P. (1921) see **GENEVA PROTOCOL**.

Protocols of the Elders of Zion. In tsarist Russia antisemitism (see **ANTI-SEMITES**) took the form of 'pogroms,' i.e. attacks against the Jews, instigated or connived at by the gov. During the pogrom in Kishinev, 1903, a short form of the protocols appeared in the Russian newspaper *Znamia*. In 1905, the P. were pub. in full in book form ('edited' by Sergei Nilus); they were repub. in 1907, and were later (especially after the First World War) trans. into Ger., Fr., Eng., It., and other languages. The P. are supposed to be an authentic report of twenty-four or twenty-seven secret meetings of Jewish elders, who at the first Zionist congress, held in Basle in 1897, conceived a terrible conspiracy to blow up the major caps. of Europe (using for this purpose the underground railways), to destroy the Aryan race and Christian civilisation, and to erect a Jewish freemason world-state. The slanderous forgery was proved by eminent journalists (such as P. Graves in *The Times*, Aug. 16, 17, and 18, 1921) and historians (such as Burtsev and Curtiss), as well as by law courts in S. Africa and Switzerland. Graves proved a literary dependence of the P. on a polemic booklet of M. Joly against Napoleon III. The foundation, in 1880, by Adolphe Crémieux, a Fr. minister of justice, of the Alliance Israélite Universelle, seems to have been one of the pretexts of this spurious document. See J. S. Curtiss, *An Appraisal of the Protocols of Zion*, 1942.

Protoevangelium Jacobi, or **Gospel of the Infancy**, anc., apocryphal gospel attributed to S. James the Less, but dating in its original form probably from the second century with later additions. It is an interesting witness to the early cultus of the Blessed Virgin, though certain passages suggest its Ebionite and Docetic origin. The name P. or *Ur-evangelium* is also given to a hypothetical narrative supposed by some to have formed the basis of the synoptic gospels. See A. Harnack, *Geschichte der Christlichen Literatur bis Eusebius*, 1893-1901.

Protophages (Πρωτοφάγες) (fl. 330-300 B.C.), Gk. painter, b. at Caunus in Caria, but spent most of his time in Rhodes. He was remarkable for the care he bestowed upon his pictures, his masterpiece, 'Ialysus,' having taken him seven years to paint.

Proton, unit of positive electricity, a hydrogen atom which has lost its single planetary electron. It is one of the ultimate constituent elements of matter.

Protophyta, name for plants of the lowest and simplest organisation.

Protoplasm, see BIOLOGY and CELL.

Protozoa, see PROTISTES.

Protozoa, great group (phylum) of unicellular creatures, the simplest and most lowly organised of living animals, and of great scientific interest and importance. The P. are divided into four classes: (1) Rhizopoda, or Lobosa, characterised by the protrusion of protoplasmic pseudopodia (false feet); Amoeba, the Foraminifera, and the Radiolaria (described below) are included here. (2) Ciliata, bearing cilia over the whole, or part, of the body; e.g. *Paramecium* (q.v.), *Vorticella*. (3) Flagellata, with a single protoplasmic whip, or flagellum, used in locomotion; e.g. *Euglena*, and the Trypanosomes, one species of which causes sleeping sickness in man. 4. Sporozoa (q.v.), the members of which are all parasitic in habit, have come within recent years to be of very practical concern, owing to the discovery that such diseases of man as malaria are caused by them. One of the simplest forms of P. is Amoeba, which occurs on the mud at the bottom of fresh-water pools and is barely visible to the naked eye as a tiny white speck. Under the microscope it is seen to be irregularly shaped and composed of protoplasm, a jelly-like material with an external layer, ectoplasm, and an inner, more opaque endoplasm, in which is a round colourless body, the nucleus; reproduction is of the simplest kind, namely div. of the nucleus and then of the surrounding protoplasm. There is no sexual reproduction, so far as is known. Many P., though unicellular, attain a wonderful complexity of structure, and it is suggested that some of them are the most complicated and highly organised cells in the whole animal kingdom. The specialisation is most apparent in the ectoplasm, which commonly becomes stiffened to form a protective pellicle or skin. In the Foraminifera and Radiolaria, it deposits calcium carbonate or silica to form a skeleton, and it is these occurring in immeasurable numbers in the ocean which compose the characteristic deposits. In other P. the ectoplasm projects as threadlike or plate-like structures capable of movement, and serving both to propel the animal through the water and to bring food within its reach. Many P. form colonies whose individual cells are usually complete and capable of separate existence; there is little differentiation into cells of different types such as occurs in the true multicellular animals (Metazoa). See 'Protozoa,' *Cambridge Natural History*, 1906; and W. F. Baradale, *The Invertebrata*, 1935.

Proudhon, Pierre Joseph (1809-65), Fr. Socialist, b. at Besançon. The son of a brewery workman, he was educated at the college of Besançon, became a printer and proof-corrector, and taught himself languages; in 1833 he was awarded a pension from the Besançon Academy. In 1840 his first important work, *Qu'est-ce que la propriété?* was pub., which contained his famous maxim, 'Property is theft'—*La*

propriété c'est le vol; this was followed by *Système des contradictions économiques ou philosophie de la misère* (1846). He settled in Paris in 1847, and occupied himself with revolutionary and socialist propagandas. He was a deputy for the Seine; failed in his foundation of a bank for lending money without interest; escaped to Brussels to avoid prosecution for his attack on the Church, *De la justice dans la révolution et dans l'Eglise*, and died at Passy on his return. P. in his Socialism was an economist and not a politician; his ideal was perfect freedom, equality, and justice, which he found in his conception of political 'anarchy' in its philosophic sense of individual freedom from all rule. He ridiculed the idea of a revolutionary change of society. His ideal was a steady working at the abolition of property, interest, rent, and the other economic factors of estab. society. To him property, like slavery, was the murder of individual freedom. As under the monarchy the king could seize the property of foreigners who died in France, under the *droit d'aubaine*, so the state should treat all property under the same right. A fundamental conception of P.'s was that all labour, mental and physical, of high or low class, should be remunerated at the same scale, on the principle that service pays service, and that time is the criterion of value. See lives by O. A. Sainte-Beuve, 1873; J. Duprat, 1929; and D. W. Brogan, 1944; also J. Bourgeat, *Pierre Joseph Proudhon, père du socialisme français*, 1943; H. de Lubac, *Proudhon et le christianisme*, 1945, and *The Un-Marxian Socialist*, 1948.

Protractor, instrument in the form of a graduated semicircle, used in setting off and measuring angles.

Proust, Marcel (1871-1922), Fr. author, b. in Paris. P. was educated at the Lycée Condorcet. His short life was uneventful. Until forced by asthma to lead the life of an invalid, he was received into the stilted Paris society of the nineties. Retiring to a secluded life, he set to work to portray, with immense creative genius in his retrospect, the society he had quitted. The first part of *À la recherche du temps perdu* was pub. in 1913, but the pub. of the second part in 1919, which was awarded the Prix Goncourt, was more enthusiastically received. P.'s phenomenal reputation, however, has been largely posthumous. His writing exposes and illuminates subtle mental processes in a way that has never been surpassed; his work is unique and he is probably the greatest single influence on the literature of this century. In *À la recherche du temps perdu* the atmosphere is indefinite, and the story incoherent. P.'s attitude to time and place follows that of Bergson; he recalls every detail of his childhood as if the past still existed, and as if events did not happen but exist, i.e. men come to events, they do not occur. P. denies the existence of the human soul, and sees reason or intellect as only an instrument which constructs simply errors and delusions. He believes that the only real substance of human

feeling lies in sensation. Occasionally through the turmoil of sensations comes something possessing a special quality: the physical world falls away and an impression of eternity penetrates into man's feelings. He is able to go back *à la recherche du temps perdu* to find that this penetration of the divine has existed all the time. The delusions of time, space, and self vanish: man is in *le temps retrouvé* and has discovered the meaning of life. His importance does not rest on his philosophy alone; his precision of detail has also attracted much attention. He possesses brilliant psychological insight and shows great artistry in his creation of characters and incidents. His novels have a unique poetic quality, every word being carefully chosen and taking a definite place in his pattern. The various novels of *A la recherche du temps perdu* appeared in the following order. They have been trans. into Eng. by C. K. Scott Moncrieff. *Du côté de chez Swann* (Swann's Way) (1913); *A l'ombre des jeunes filles en fleurs* (Within a Budding Grove) (1918); *Le côté de Guermantes* (The Guermantes Way), Part I. (1920); Part II. (1921); *Sodome et Gomorrhe* (Cities of the Plain), Part I. (1921); Part II. (1922); Part III. (1923); *La Prisonnière* (The Captive) (1924); *Albertine disparue* (The Sweet Cheat Gone) (1925). S. Hudson trans. *Le Temps retrouvé* (1927), under the title of *Time Regained*. Letters to a Friend, trans. by A. and Elizabeth Hamilton (1950), is a collection of P.'s letters, covering the period 1904-19. See lives by C. K. Scott Moncrieff, 1924; L. Pierre-Quint, 1925; P. Sunday, 1927; C. Bell, 1927; U. D. Lindner, 1943; J. Bret, 1946; and C. Blondel, *La Psychographie de Marcel Proust*, 1932; K. Jäckel, *Bergson and Proust*, 1934; S. de Souza, *La Philosophie de Marcel Proust*, 1939; F. C. Green, *The Mind of Proust*, 1949; and H. March, *The Two Worlds of Marcel Proust*, 1949. Prout, Father, see MAHONY, FRANCIS SYLVESTER.

Prout, William (1785-1850). Eng. chemist and physician, b. at Horton, Gloucestershire. Though his early education had been neglected he took a medical degree at Edinburgh (1811) with a thesis on intermittent fevers. He was admitted L.R.C.P. in 1812 and settled in London. He was one of the pioneers of physiological chem. and discovered (1823) the presence of hydrochloric acid in the gastric juice. But he is chiefly remembered as the originator of 'P.'s hypothesis' (1815), a modification of the atomic theory, which gave an impetus to the exact experimental investigation of atomic weights. It was P. who put forward the theory that hydrogen was the fundamental unit from which all elements were formed.

Provençal Language and Literature. The P. language, also called, improperly, *langue d'oc* (its ter. des not correspond to that of Provence) or *limousin*, which refers to the dialects and the literary language of the whole of the S. of France, is one of the group of Romance languages that arose from the Lat. tongue. At the

time when its literature was at its height (twelfth to fourteenth centuries) the P. language was spoken over a considerable extent of ter., reaching as far N. as the Loire and from the Alps to the Pyrenees. It was one of the earliest of the Romance languages to develop, and in many most important particulars it differed considerably from the N. tongue, the *langue d'oïl*, which political circumstance has made the official Fr. tongue. It stood, indeed, in much closer connection with Catalan than with Fr., and it is also much nearer to Lat. than the *langue d'oïl*. The chief distinction between the P. language and the language of oïl is that the former retains the Lat. s of unaccented syllables, while the latter has softened it to z. Thus we have P. *bona* = Fr. *bonne*, P. *amat* = O.F. *amet*, modern *aimé*. The P. language ceased to be used for literary purposes by the fifteenth century. After three centuries of existence as a vernacular, a revival took place. This revival has been carried on principally by a society known as the Félibrige, the purpose of which is 'to bring together and to encourage those who by their writings preserve the language of the land of Oc, and also those scholars and artists who study and work in the interest of this region.' The society was formed in 1854 by seven poets, Joseph Roumanillo, Frédéric Mistral, Eugène Garcin, Théodore Aubanel, Anselme Mathieu, Paul Giera, and Alphonse Tavan. On Garcin's secession, his name was replaced by that of Jean Brunet. The association of the Félibres contains poets and writers of the first rank, and they have done much to raise P. to the rank of a literary language. The form of P. which they use is the dialect of Saint-Rémy, though many prefer the language of Limousin, which for a certain period was the *langue* of the troubadours. There is an ann. pub. with a wide circulation in the Midi and sev. of the prin. towns have P. periodicals. With many Fr. modifications and local differences the P. dialects linger on in S. France, Monaco, the N.W. corner of Italy, and the N.E. corner of Spain.

The Literature.—P. literature contains the earliest fragment of any of the Romance languages, part of a trans. of Boethius which dates from the late tenth century. This is of interest linguistically, but in no other way. P. literature proper begins in the next century. After a period of great prosperity Provence and Catalonia were united in the early twelfth century under the sovereignty of Raymond-Bérenger, and this union of two peoples speaking almost one language gave a fresh impetus to the poetical spirit which must long have been maturing. P. poetry seems, indeed, to us to have had no beginning, no period of tentative strivings after forms and modes of expression. It is first seen in its maturity. The poetry of the troubadours (*q.v.*) was almost entirely lyrical. Thus almost the whole body of the literature, with a few exceptions, epic works described by Fauriel in his *Épopées chevaleresque au moyen âge*, consists of occasional poems remarkable

for their wit and sentiment. Rhyme is easy, and so, in order to increase the difficulty and the artistic merit of their compositions, the troubadours made use of the most intricate systems of rhyme. But the very excellence of their form makes the work of trans. almost impossible.

The golden period of P. poetry was from 1150 to 1280. Among the famous troubadours of this period may be mentioned Marcubru and the Monk of Montaudon, powerful writers of biting satire; Jaufre Rudel, prince de Blaia; Rimbaut d'Orange, with whom one of the best of the women poets, Beatrice de Die, exchanged love songs; Arnaut de Mareuil, whom Petrarch speaks of as 'the less famous Arnaut,' referring here to Arnaut Daniel, whom Dante also regarded as the greatest of the love-poets (*Purg.* xxvi.); Folquet, afterwards bishop of Marseilles; Giraut de Bornell, whom the Ps. themselves have always considered as their greatest poet; and Peire Cardinal, one of the greatest of the satirists. These are but a few out of a long list of more than 400. The decay of P. literature began with the Albigensian crusade, and the close association of the 'heretics' with Provence led to their language being strictly banned by the eccles. authorities. By the end of the thirteenth century the true P. literature was dead.

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Provence, maritime prov. of France according to the anc't. div. It was bounded on the S. by the Mediterranean Sea, and derived its name from the Rom. prov. of Gaul known simply as *Provincia* (the prov.). It included the modern dept's. of Basses-Alpes and Bouches-du-Rhône, together with some parts of Drôme, Vaucluse, and Alpes-Maritimes. The country was a prosperous one, though it had a varied and troubled hist. during the centuries from the death of Lothair (855) until the death of Count Raymond-Bérenger IV. (1245). Its boundaries were continually changing. Its cap. moved from Aix to Arles with Marseilles as another important city. On the death of Raymond-Bérenger IV. the co. passed to his daughter Beatrice; by her marriage with Charles of Anjou it came under Angevin rule. It was during the preceding period, however, under the house of Barcelona, that P. became the seat of that literature which has given the chief celebrity to its name and the chief interest to its hist. The hist. of P. during the later Middle Ages was extremely troubled, and P. was drained of her wealth in wars between her Angevin kings and their enemies. It was claimed at one time by John of Gaunt. Charles, count of Maine, on his death in 1481, bequeathed P. to

Louis XI. of France, but it was not finally annexed to the Fr. crown until the next reign (Charles VIII.). P. kept some privileges, including an assembly of estates which existed into the seventeenth century, and it never became as absorbed in France proper as the other provs. did. P. still retains a most individual character. There are many Rom. and some Hellenic remains around Marseilles. See A. Fabre, *Histoire de Provence*, 1833; T. A. Cook, *Old Provence*, 1905; R. Bernoulli, *Die romanische Portalarchitektur in der Provence*, 1906; E. Camau, *La Provence à travers les siècles*, 1907-30; C. Headlam, *Provence and Languedoc*, 1912; E. Benévent, *Provence*, 1931; and F. M. Ford, *Provence*, 1938.

Proverb (from Lat. *pro*, forth, to the world, and *verbum*, word), fragment of folk-literature or, as the Gks. phrased it, 'a wayside saying' (*παροιμία*) embodying a moral lesson or obvious truth. Though, like 'epigram,' it is a word which defies succinct explanation, the essence of its meaning may be gathered from the sum of the following definitions. According to Synestus, Aristotle remarked that 'a proverb is a remnant from old philosophy, preserved amid countless destructions, by reason of its brevity and fitness for use.' Cervantes speaks of Ps. as 'short sentences drawn from long experience'; Lord Russell described them as 'The wisdom of many and the wit of one,' and a profound truth is enshrined in the observation of the Abbé de Saint-Pierre: 'Les proverbes sont les échos de l'expérience.' 'Shortness, sense, salt,' and, be it added, popularity are common attributes of Ps. Sometimes they are alliterative as the Scottish 'Better a toom (empty) house than an ill tenant,' or the It. 'Traduttori, traditori' (Translators, traitors); sometimes they are metrical like the Gk. *ἡδὴ γὰρ μάθῃμεν* (No pain, no gain). Often they substitute the concrete for the abstract, as in 'The wine-cup drowns more than the ocean,' which is another way of saying that 'More die from drunkenness than drowning,' and often again they embrace a moral apophthegm, as in the biblical 'Whatsoever a man soweth, that shall he also reap,' and the Turkish, 'God makes a nest for the blind bird.' Most Ps., moreover, are scraps of unfathered wit or wisdom whose origin is unknown; the stamp of popular approval alone makes a saying, however shrewd, a saw. But exceptions to this are: 'One butcher can face many sheep' which was the comment of Alexander, when his generals described the magnitude of the Persian armies, and also Emperor Ferdinand's retort to his doctor, 'Kaiser bin i' knüdel muss i' haben' (The king shall have his dumplings), which is now universally recognised as amusingly typical of an obstinate man. The same truth will often be found expressed proverbially but variously in different countries. The Gks. equivalent to 'Coals to Newcastle' is 'Owls to Athens'; in the Middle Ages men spoke of 'Indulgences to Rome,' and orientals similarly say 'Popper to Hindustan.' The Eng. 'gift horse' derives from

a Lat. P. quoted by St. Jerome (*Ep. ad Ephes.*, proem): 'Equi donati dentes non inspicuntur,' as also does the medieval rhyming Lat. hexameter, 'Si quis dat mannos, ne quere in dentibus annos' (If any one gives horses, don't find out their age from the teeth). It has been said that Ps. on shrine national traits; there is a Machiavellian ring about 'Revenge is a morsel for God' which betrays its It. origin, and only an Eastern slave could have invented the subtle counsel; 'Kiss the hand thou canst not bite.' In conclusion it may be observed that adages are as old as the hills, and are common to all languages and people; the Sp. have as many as 30,000, whilst Wander actually estimated the Ger. at 145,000. These concise expressions were especially popular in the Middle Ages and abound in the writings of Cervantes, Rabelais, and Montaigne; but they are in rarer use to-day.

Prin. early collections of Ps. in Eng. are J. Taverner, *Proverbs or Adages out of Erasmus* (1539); J. Heywood, *Proverbs* (1546), and *Epigrams* (1562); J. Florio, *First Fruits* (1578), and *Second Fruits* (1591); G. Herbert, *Jacula Prudentum* (2nd ed., 1640); J. Howell, *Proverbs* (1659); J. Ray, *Proverbs* (1677) (5th ed. 1813); and J. Fuller, *Gnomologia* (1732). See G. W. F. Freytag, *Proverbia* (Arabic), 1838-43; Le Roux de Lincy, *Livre des proverbes français*, 1859; G. L. Apperson, *English Proverbs and Proverbial Phrases*, 1929; and *Oxford Dictionary of Proverbs*.

Proverbs, Book of (Heb. *Mishle-Shelomo*, 'Solomon's Proverbs'; Gk. *προιμια*; Lat. *Proverbia*), the first and most famous of the Wisdom books (or gnomic literature) of the Bible. In the Heb. Bible it belongs to the third div., called *Ketubin* or 'writings,' and follows the Book of Psalms. It is rich in language, form, and matter. Tradition ascribes the B. of P. to Solomon, whose name is attached to some chapters (i. 1; x. 1; xxv. 1), but according to some scholars it was the custom of the times to borrow the name of some famous man in the past to lend distinction to a new compilation. Ch. xxx. is ascribed to Agur and ch. xxxi. to King Lemuel and to his mother, but nothing is known of either of them. The book is divided by some scholars into five sections (i.-ix.; x.-xxii. 16; xxii. 17-xxiv.; xxv.-xxix.; xxx.-xxxi.), by others into nine parts (xxiv. 23-34 being considered as a separate section, and chs. xxx.-xxxi. being subdivided into four parts). As to its date, the B. of P. is generally assigned to a late post-exilic period (400-250 B.C.), but the close likeness in form of some of the material in P. with the recently discovered Egyptian book of wisdom called the 'Teaching of Amen-em-ope,' and the anct. tradition of the wisdom and the sayings of Solomon (cf., e.g., 1 Kings v. 9-12), show that the B. of P. may well contain reminiscences of Solomon's sayings. The B. of P. is a guide to right-living and purity in the daily round of duties; it is, indeed, confined within the limits of this life's horizon. It condenses in pithy sentences various

forms of evil, its motto being 'Trust in God and do the right.' Like the Book of Job it deals with providential rewards and punishments, but it is occupied with their practical application rather than with their theological significance. Anger, idleness, lustfulness, misuse of the tongue, violent or fraudulent ways of attaining wealth, are held up to reprobation, but the dominant note of P. is insistence on wisdom, regarded as a divine attribute.

Providence, port of entry and cap. of P. co. and of Rhode Is., U.S.A., on Narragansett Bay, 44 m. S.W. of Boston, Massachusetts. It is noted for manufacturing industries, including jewellery, tools, locomotives, firearms, cotton, and woollen goods, mostly along the banks of the Woonasquatucket and Moshassuk. Dyeing, slaughtering, and meat packing are also carried on. P. was founded on commerce, but immigration in the early twentieth century, particularly of large numbers of Its. and Fr., has much altered its traditional New England character. It has many fine public buildings, among them the magnificent new State House, the city hall, a Rom. Catholic cathedral, the Union railway station (1897), Butler Hospital, and Brown Univ. (a Baptist institution, founded 1764). Settled by Roger Williams (1636), it contains Roger Williams Park to the S. Pop. 2.3, 501.

Province, in Rom. hist. meant ter. outside Italy under the administration of a governor or proprietor. The etymology of the word is doubtful, but it was specifically applied to the dist. round Massilia (Marseille) which, as Rome's first conquest outside the It. peninsula, was known as Provincia and which is still known as Provence (*q.v.*). Subsequent conquests were also formed into Ps. The Ps. which Cæsar found in existence were fourteen in number: Seven European—Further and Hither Spain, Transalpine Gaul, It. Gaul with Illyricum, Macedonia with Greece, Sicily, and Sardinia with Corsica; five Asiatic—Asia, Bithynia, and Pontus, Cilicia with Cyprus, Syria and Judea; and two African—Cyrene and Achaia. To these Cæsar added three new ones by the creation of the two new governorships of Lugdunensæ Gaul and Belgica, and by constituting Illyricum a separate P. Subsequently Britain was added. The word P. is now used for the regions or dists. which go to form a federation, in which meaning it is obviously almost interchangeable with state—thus the constituent political divs. of the Canadian federation are called Ps.; but those of the commonwealth of Australia are called states; while the constituents of India are still (1950) known as governors' Ps., though some of them, e.g. Bihar, W. Bengal, are now under the new constitution, styled states or member-states of the union of India. Before the Fr. Revolution the word P. was used for the many famous historic dists. into which France was divided before the system of depts. took their place (see FRANCE, *Population*). The political divs. of Belgium, Holland, Spain, and many other

unitary states are also known as Ps. For eccles. purposes England and Wales are divided into three Ps., Canterbury, York, and Wales, each being under the jurisdiction of an archbishop or metropolitan.

Provinces Wellesley, Brit. colony since 1793, on the W. coast of the Malay Peninsula, formerly part of the crown colony of Penang in the Straits Settlements. It averages 8 m. in width and 45 m. along the coast. The prov. is extensively cultivated. Rice, sugar, pepper, tobacco, rubber, tapioca, spices, and coco-nuts are produced. P. W. fell to the Jap. in Jan. 1941, but was recovered on the Jap. surrender in 1945. After the Second World War it was included in the Malayan Federation. Pop. about 120,000.

Provins, tn. in the dept. of Seine-et-Marne, France, 58 m. S.E. of Paris. It has some fine specimens of Gothic architecture and is noted for the cultivation of roses. It was known as Pruvium in Rom. times, and was an important medieval city. Pop. 8000.

Provision (law), in the reign of Henry III., besides the older forms of legislation by charter and assize, that of Ps. was added, e.g. the Ps. of Oxford or ordinances for checking the king's misrule drawn up by the barons under Simon de Montfort in 1258, and those of Westminster, 1259 (re-enacted as the Statute of Marlborough, 1267), exempting knights from jury service, limiting the right of distraint, checking abuse of wardship and succession, etc. From the reign of Edward I. legislation was by statute and ordinance. The word P. now means simply a legal or formal statement providing for something, as in the clauses of a statute. A proviso is a qualifying clause in any legal document by which a condition is introduced, generally beginning with the words 'provided that,' or a conditional stipulation affecting an agreement, contract, or grant. Where there is a conflict of meaning between a P. in a statute and a clause in a schedule to the Act, the P. prevails as being a part of the operative clauses of the Act. See also INTERPRETATION ACT.

Provisional Order. P. Os. are issued by gov. depts. when a local authority promotes a private Bill. Before granting the order the dept. to whom application has been made for it may hold a local inquiry into the matter, and cause full provision to be made for serving notices upon all persons or bodies interested. The Confirming Act (where required) is obtained by the dept. itself if the Bill based on the P. O. is unopposed; if opposed the Bill must be supported by the local authority at their own expense. P. Os. can only be made when a statute has been passed which specifically empowers a minister to issue them. They therefore may be regarded as an example of delegated legislation, but are really part of the central authority's pre-legislative work, for they are only provisional unless Parliament has passed a Provisional Orders Confirmation Act, giving the force of law to a number of them simultaneously. In the case, however, of a P. O.

for a reconstruction scheme under the Housing Acts, confirmation is not necessary unless it is proposed to take lands compulsorily.

Provisions of Oxford, see under MONTFORT, SIMON DE, EARL OF LEICESTER.

Provisors, Statute of. This, a celebrated statute which was passed in 1350, was the culminating point of the remonstrances against the papal pretensions to the disposition of eccles. benefices, and, in particular, against the making of provisions or reversionary grants during the lives of incumbents. It maintained the rights of patrons, and threatened all who procured promotion by papal provision with forfeiture and banishment. It was frequently re-enacted in consequence of no less frequent evasions, and later was strengthened by the Statutes of Praemunire (q.v.).

Provo, city and co. seat of Utah co., Utah, U.S.A., 39 m. S.E. of Salt Lake city. Its chief manufs. are woollen goods and flour. It manufs. also steel goods, crocotes, and sugar. It is named after Provot, who explored the valley in 1825. P. is the seat of Brigham Young Univ. Pop. 18,100.

Provost (Lat. *praepositus*, prefect, the chief of a body or community), in Scotland, denotes the chief municipal officer or magistrate, corresponding to the Eng. 'mayor' (q.v.). The Ps. of Aberdeen, Dundee, Edinburgh, Glasgow, and Perth are entitled Lord Ps. In France *prévôt* is applied to persons who discharge various functions (marshal, magistrate, mayor, or justice). In England it is apparently restricted to the heads of certain colleges in the univs. of Oxford and Cambridge. There is also a P. of Eton.

Provost-Marshal, commissioned officer specially appointed by the general officer commanding a corps on active service to arrest deserters and other offenders against military law and to carry out the sentences passed by courts-martial. The P.-M. is the chief of the military police in a garrison tn. or camp.

Proxy (derivation apparently the same as that of proctor (q.v.)), agency of a substitute, or by extension the name for the agent himself. Until 1868 in parl. procedure a peer of Parliament could by a crown licence constitute another peer, of the same degree in the peerage with himself, his P. to vote for him in his absence. In company law a P. is a writing authorising a person to vote in place of a shareholder at a certain meeting or at a series of meetings. Ps. are also used in bankruptcy proceedings. They are allowed in convocation and in Amer. political conventions. During the Second World War Brit. forces were able to vote by P. at political elections. Marriage by P. is possible in some countries; it was much done in Germany during the Second World War. It cannot take place in England.

Prudential Assurance Company Ltd., The. The Prudential Mutual Assurance, Investment, and Loan Association was founded in 1848 as an ordinary life office; it instituted industrial assurance in 1856.

and was responsible for its remarkable development. The company was registered under its present name in 1867 after absorbing sev. smaller companies. In 1919 it began to transact general insurance: fire, accident, burglary, marine, etc., and now has a world-wide business. It has business in one-third of the homes in the United Kingdom and N. Ireland, and is the largest life office in the Brit. Commonwealth, having branches throughout the commonwealth and the Near E. It also has agencies for fire and marine business in the prin. cities of the world, and a subsidiary fire office in New York. In 1912 the P. A. C. first introduced the 'block' system to centralise the collection of premiums, a system since widely adopted in the United Kingdom, U.S.A., and France. In the two world wars the company subscribed largely to gov. loans, and has over 90 per cent. of its funds invested in the United Kingdom.

Prudentius, Aurelius Clemens (A.D. 348-c. 405), poet of the early Lat. Church, b. in Spain, and a contemporary of Ambrose, Augustine, and Jerome. His works include hymns and poems on religious subjects, such as the *Cathemerinon* and *Psychomachia* (a religious allegory). He is regarded as the foremost poet of the early Lat. church. See ed. of T. Obbarius (1845) and H. Dressel (1860). See lives by J. P. von Ludewig, 1692; H. Brockhaus, 1872, and J. Bergmann, 1921; also E. Faguet, *De Prudentis Carminibus*, 1883; F. St. J. Thackeray, *Translations from Prudentius*, 1890; G. Boissier, *La Fin du paganisme*, 1898; and T. R. Glover, *Life and Letters in the Fourth Century*, 1901.

Prudhoe, vil. and urb. dist. of Northumberland, England, situated on the N. bank of the Tyne, 10 m. W. of Newcastle, and about the same distance E. of Hexham. There are the ruins of a Norman castle built 1161-82 by Odinel de Unfrerville, on the site of a Brit. fort. It later belonged to the Percys. About 60 per cent. of the employable labour is engaged in coal-mining. The remainder are occupied in agriculture or brick manufact., or on work in the large fertilizer factory built in 1911. Thomas Bewick, the engraver, was b. in the dist. Pop. 9500.

Prudhomme, René François Armand Sully, see SULLY-PRUDHOMME.

Prud'hon, Pierre Paul (1758-1823). Fr. historical and portrait painter, b. at Cluny and educated at the Dijon Academy and in Italy. He won the Grand Prix de Rome (1782), where he resided till 1789, becoming a friend of Canova. His chief works include 'Justice and Divine Vengeance pursuing Crime' (1808 Louvre); 'Rape of Psyche' (1812); 'Interview between Napoleon I. and Francis II. after Austerlitz,' and 'The Empress Josephine.' He also decorated the Louvre with ceiling paintings. See lives by C. Clément, 1872; C. Martino, 1924; R. Ragnay, 1928; J. de Goncourt, *L'Art du XIX^{me} siècle*, 1882; and E. Hildebrandt, *Die Malerei und Plastik des 18. Jahrhunderts in Frankreich*, 1921.

Prune, dried plum, and also the name

of varieties of plum-trees which are cultivated as being specially suitable for drying on account of their firm texture. Large quantities, mostly sun-dried, are imported into Britain, although it has been demonstrated that Brit. grown fruit dried by artificial heat in specially constructed drying stoves compares very favourably with the imported fruit. The art of plum drying is most highly developed in California, and more than a third of the imports are derived from that state; but the finest quality comes from France, where the fruit is boiled immediately after gathering and then when cool is exposed to the sun in trays until thoroughly desiccated. Ps. are valuable for their laxative qualities.

Prunella, or **Prunello**, smooth (black or purplish) woollen stuff used for the uppers of gaiters and shoes, or as 'lasting,' formerly also for clergymen's and baristers' gowns.

Pruning, art of regulating plant growth by cutting away superfluous and unwanted shoots and branches with the object of (1) regulating the shape, and/or (2) increasing the production of flowers or fruit. P. tools (knife, sécateurs, or saw) should be sharp so that they leave clean-cut surfaces, edged with healthy bark intact so that they callus over quickly. Large cut surfaces, following the removal of big branches, should be protected from weather and fungus infection by a dressing of Stockholm tar, white lead paint, or a proprietary tree antiseptic. P. cuts should be made immediately above a suitably placed bud or lateral shoot, or flush at the base of the junction with a larger branch. Otherwise any stub will only die back and invite disease. Severe P. encourages wood growth; light P. fosters development of fruiting wood. Therefore, where new wood growth is required, P. should necessarily be severe. When trees are young, P. for fruit must be subordinated to P. for wood growth in order to build up the branch framework of a well-balanced tree and to form a shapely specimen. In later years P. is less severe and is devoted to the removal of diseased or weak growth, to the keeping of the branch work open to air and sun, and to the renewal and formation of fruiting wood. Apples and pears are pruned on similar lines. Winter P. may be carried out at any time while trees are dormant, usually before the winter spraying is done. There is no single ideal P. system. The growth habit of individual varieties must be studied. Some varieties bear on fruit spurs along the branches, some at the tips of shoots as well. The type of tree, its root-stock, and its manuring and performance during the previous season also influence the amount of P. needed. Generally weak growers can be pruned more severely than strong ones. Winter P. largely consists of shortening leader shoots and cutting back laterals more severely, and, in the case of mature fruiting trees, of thinning fruit spurs and developing renewal fruit-bearing wood. Root P. is carried out when young trees of five to six

years fail to respond to top P. by fruiting, and is done in Nov. Summer P. is a distinct operation; chiefly essential on cordon, dwarf pyramid, and wall-grown trees, and usually consists of restricting tip growth of the current season. The Lorette system of P., developed by Louis Lorette, of Wagonville, France, aims at the forced development of fruit-buds by consistent severe P. throughout spring and summer, with no winter P. It is particularly suited to pears, producing heavy crops, but more practical for amateurs than commercial growers.

Various Fruits—Apricots fruit on the current season's and on mature wood. P. is done in the growing season with the object of keeping up an abundant supply of wood growth. Cherries, once framework is estab., are pruned in July, though orchard trees need little P. Peach and nectarine may be pruned in Feb. to induce growth of framework wood, and renewal fruiting wood when trained indoors or on walls; in April out of doors for bush trees, and again in autumn. Plums (including damsons) need little P. when desired shape is estab. Any cutting-out of branches is best done in June or July to avoid silver-leaf infection. Black-currants, after the third year, are pruned by cutting out about one-third of the older branches at ground level during the winter, to maintain a steady supply of renewal fruiting wood. Red and white currants are pruned by methods similar to those used in the case of apples, by cutting laterals back to within two buds of the base in winter or spring. Brambles (loganberry, raspberry, hybrid berries) require the fruited wood cut away at soil level in late autumn, with new canes to take their place. Blackberries only need dead wood and old wood cut out, and thinning. Figs need surplus suckers and shoots removed in autumn. Gooseberries may be spur-pruned as red currants or allowed to develop long shoots and merely thinned in winter. Nuts need P. in winter to thin out old wood, and in summer when side shoots are shortened to about five leaf buds.

Ornamental Trees and Shrubs.—Deciduous trees are best pruned between early June and Dec., though most may be pruned in winter. Maples, birches, and walnuts bleed if pruned in late winter or spring; stone fruits like cherries should be pruned before mid July. Evergreen trees and shrubs are best pruned in April or May. Flowering shrubs are pruned according to their habit of growth. Those which produce their flowers on new wood ripened the previous year are pruned as soon as the flowers fade; those which produce their flowers on older, mature wood are pruned in Feb., but most shrubs need no regular P. Roses are pruned according to their type. Tea, Hybrid Tea, Hybrid Perpetual, Pernetiana, Polyantha, and climber tea roses are best pruned in March or April. Other climbing roses are pruned just after flowering, while ramblers are pruned according to whether they flower on new or old wood. Most climbing plants may be pruned in

Feb. or March, though flowering kinds such as *Lonicera* and *Wistaria* are also pruned after flowering.

See H. Dunkin, *The Pruning of Hardy Fruit Trees*, 1934; H. Dallimore, *The Pruning of Trees and Shrubs*, 1945; and C. R. Thompson, *The Pruning of Apples and Pears by Renewal Methods*, 1949.

Prunus, genus of deciduous and evergreen trees and shrubs (family *Rosaceae*), bearing racemes of white or pink flowers, followed by drupaceous fruits with a smooth stone. Almonds, peaches, apricots, plums, and cherries belong to the genus. Other species include *P. Padus*, bird cherry, a handsome Brit. tree often grown in shrubberies, and *P. laurocerasus*, the cherry or common laurel.

Prussia, former name of a region in N. Europe. The area has varied considerably in size and political construction at different times. It has been (1) the ter. of the Borussi, heathen tribes of Slav origin, covering regions on the E. bank of the R. Vistula, as well as the whole of the later prov. of E. P.; (2) 1701-1866, a Hohenzollern kingdom, ruled by the family which had previously been electors of Brandenburg. A section of it, lying between the E. border of Pomerania and the R. Elbe, was part of the Holy Rom., later Austrian, Empire; (3) 1866-1918, the largest and most influential Ger. state. The term was expanded to cover all the conquests made while Bismarck was in power. This meant that it applied to almost all N. Germany; (4) 1918-45, the remnants of (3) left to Germany after the peace treaties following the First World War. The last P. was a republic.

The republic of P. in 1935 had an area of slightly more than 113,000 sq. m. By the treaty of Versailles (1919) and the div. of Silesia P. had been deprived of 21,646 sq. m., but had received as an addition the principality of Waldeck in 1929. It comprised the greater part of N. Germany, bounded on the N. by the Baltic, Mecklenburg, Denmark, and the North Sea; on the S. by Thuringia, Saxony, and Czechoslovakia; on the E. by Poland; and on the W. by Belgium, the Netherlands, and Luxembourg. The pop. of P. in 1935 was 40,745,000. It was divided into fifteen provs. of which one was the cap., Berlin. Other large cities were Cologne, Breslau (now Wrocław), Essen, Frankfurt-on-Main, Dortmund, Düsseldorf, Hanover, Duisburg, Wuppertal, Gelsenkirchen, Bochum, Magdeburg, Königsberg (now Kaliningrad), Stettin (Szczecin), and Kiel. About three-fifths of the republic consisted of lowland and belonged to the Great N. European plain. The S.E. was the more mountainous portion. The Sudeten chain separated P. from Austria and Bohemia and included the Riesengebirge with Schneekoppe (4929 ft.), the highest mt. in P. The land, drained by the Rts. Vistula, Oder, Niemen, Elbe, Weser, Ems, and Rhine, possessed a good canal system, much of it constructed at the beginning of the twentieth century. The coast-line was over 1000 m. long and possessed most of Germany's important seaports, excepting Hamburg, Lübeck, and Bremen.

Education and Religion.—Education was compulsory, and attained a high standard on the technical side. The largest Prussian univ. was at Berlin, and the next in size were Breslau, Bonn, Göttingen, and Halle. In 1935 rather less than two-thirds of the pop. was Protestant, the rest being Rom. Catholic, with a Jewish pop. of about 100,000. This last was practically exterminated by Hitler.

Constitution.—After the abolition of the monarchy a Prussian constituent assembly was elected by universal suffrage in 1919. A republican constitution was adopted. P. was governed by a Cabinet appointed by a premier who was elected by the Diet, which itself was elected for four years by universal suffrage on a basis of proportional representation. The *Staatsrat* (State Council) was an advisory body, consisting of representatives from the provs., elected on the basis of one to every 50,000 inhab. For local gov. the fifteen provs., each under a governor, were divided into gov. dists. under a president, rural circles under elected deliberative assemblies, and urban circles under a burgomaster. When the National Socialists seized the gov. of P. in Jan. 1933, the constitution was abrogated and popular gov. and the Diet abolished. P. was put under the absolute rule of a *statthalter* (governor), who appointed his own Cabinet. Hitler, the Ger. chancellor, was *statthalter*; while Goering was Prime Minister. Ironically the liquidation of P. formally decreed by the Allies after the Second World War, was prepared by the Nazi regime, though for an entirely different reason.

History.—The kingdom of P. grew out of Brandenburg, conquered from Slav tribes in the tenth century by Otto I. Henry the Fowler estab. it as a frontier unit, a mark, to guard the line of the Elbe against the Wends, in the belt of forest and marshy plain which stretched unbroken across to Russia. From the Elbe the mark extended E. in the later Middle Ages to and across the Oder, its progress facilitated by the arrival of Ger. colonists from the W. It carried with it Christianity and a feudal organisation of Ger. lords over Wendish serfs, which long characterised it. As an electorate the mark passed in 1155 to the Hohenzollerns, by origin a Swabian family. The country was poor and barren, surrounded by rival states, but Hohenzollern rule, under a succession of capable and ruthless electors, was steadily consolidated. At the Reformation the country became Lutheran, though the elector later became a Calvinist. The elector gained much from the secularisation of property at this time. In the thirteenth century the military order of the Teutonic knights conquered and Christianised the pagan Borussi, in the S.E. Baltic, but had then declined before the advancing power of Poland. In 1825 this ter., E. Prussia, was declared a secular duchy by the grand master of the Teutonic Order, Albert of Hohenzollern, under Polish suzerainty. In 1614 Brandenburg gained the duchies of Jülicher and Cleves by

inheritance, and in 1618, on the death of the duke of P., P. and Brandenburg were united under a single Hohenzollern. Under Frederick William, the Great Elector (1640–88) (q.v.), Brandenburg-Prussia became a leading European power. Frederick William, more than any other, gave the Prussian monarchy its specific form and character. Energetic, opportunist, and totally unscrupulous, he built the two bastions of the monarchy, the standing army, and the efficient, centralised administrative system. At the peace of Westphalia he secured part of Pomerania and additions to Brandenburg in the S.W., across the Elbe. His armies defeated the Fr. and the Swedes, while out of Swedish conflicts with Poland he secured the complete independence of E. Prussia from Polish suzerainty. Frederick William's son, Frederick I. king of P. (q.v.), raised his country to the status of a kingdom, crowning himself at Königsberg in 1701. His title was a Prussian and not a Brandenburg one, since the emperor insisted, for reasons of prestige, that the royal title should be associated with Hohenzollern ters. beyond the boundaries of the empire. Frederick II. the Great (1740–86) (q.v.) used the army collected by his father to take Silesia from Austria, and, in the first partition of Poland, gained W. P., thus linking his previously scattered ters. He also encouraged economic reforms. His Silesian policy inaugurated the struggle for supremacy in Germany between Hapsburg and Hohenzollern which ended in Prussian victory in 1866, and greatly upset the existing balance in Europe. In the Seven Years war (1756–63) P. was attacked by Austria aided by Russia and France, but survived very largely because of the subsidies supplied by her new ally, England. Then onwards, until the outbreak of the Fr. revolutionary wars, P. enjoyed a period of peace. In 1806 Frederick William III. (q.v.) was forced into war by Napoleon and defeated at Jena and Auerstädt. He was deprived of all Polish ters, except W. P., and of all land W. of the Elbe, but at the end of the wars with France P. was re-estab. and her ters. extended. By the peace of Vienna P. obtained N. Saxony, Danzig, Thorn, the former Polish prov. of Posen (Poznań), Swedish Pomerania, and Rügen, and most of the Rhineland and Westphalia. The rivalry between P. and Austria became more bitter. William I. (q.v.) became king in 1861. Bismarck (q.v.) was made his Prime Minister in 1862. In 1864 P. went to war with Denmark and obtained Schleswig-Holstein: two years later she fought and defeated Austria at Sadowa. The free city of Frankfurt, the duchy of Nassau, the electorate of Hesse, and the kingdom of Hanover were subsequently annexed. A N. Ger. confederation, headed by P., was estab. . 1870 the Franco-Prussian war broke out, and the hegemony of P. within the Ger. federation was completed at Versailles on Jan. 18, 1871, when King William I. of P. was elected emperor of the Ger. Empire. Alsace-Lorraine became

part of the empire, but was garrisoned largely by Prussians. P. was far stronger than all the rest of the states of the empire combined, and William I. further increased the strength of the Prussian Army, and founded a Prussianised Ger. Navy. The 'Prussian philosophy', which seems to have originated in Brandenburg rather than in the E. or W. Prussian provs., which always displayed a certain amount of independence, put into action by the Great Elector and followed by his successors—the belief in the complete supremacy of the state, and the dominance in that state of the military and civil servant classes, both drawn from the Prussian nobility—was, under the empire, instilled into all Germany. William II. (q.v.) succeeded in 1888. With Bismarck's fall from power in 1890 the consolidation of the empire ceased, and a policy for the aggrandisement of P. was adopted which led to a period of disintegration from 1890 to 1918. On Nov. 13, 1918, after the First World War, P. was proclaimed a republic, and William II. abdicated. The relations between the Reich and P. were the outstanding problem of the empire, and remained the difficulty of the republic until the revolution of 1933, the Prussian Gov. being dissatisfied with the amount of autonomy allowed to it by the Federal Gov. The strong social-democrat element in the Prussian Gov. led to an alliance of the *Junkers* with the Nazis, in the hope of regaining their former dominance through a Nazi revolution. But the Nazi victory of 1933 brought the Prussian provs. under the direct control of the Reich, and the prov. governors (*Oberpräsidenten*) were put in a position parallel to that of the governors (*Reichsstatthalter*) in the other Länder. P. was, in fact, merged with the Reich, and ceased to possess an individual political personality, though Prussian ideals had a high place in Nazi policy, and Prussians continued to provide the majority of the military leaders of Germany. Prussianism was, however, harnessed to National Socialism: it did not control it. In Feb. 1946 the Allied Control Council sanctioned the dissolution of P., whose constituent provs. were scattered over the four occupation zones (Brit., Amer. Fr., and Russian), other parts going to Poland. P.'s historical dissolution was probably inevitable, since the name had been so closely and exclusively identified with Ger. militarism since the seventeenth century, while Poland traced the hist. of Ger. aggression, through the Teutonic Prussian knights, back into the Middle Ages. See further under BRANDENBURG; EASTERN FRONT OF RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR; EAST PRUSSIA; FREDERICK I.; FREDERICK II.; FREDERICK WILLIAM, 'GREAT ELECTOR'; GERMANY; WEST PRUSSIA; WEST GERMAN REPUBLIC. See F. Carlyle, *History of Frederick the Great*, 1858–65; F. Meinecke, *Preussen und Deutschland in 19. und 20. Jahrhunderte*, 1918; H. Eulenberg, *Die Hohenzollern*, 1928; L. von Ranke, *Twelve Books of Prussian History*, 1930; A. Moeller van den Bruck,

Der preussische Stil, 1931; W. Dillthey, *Zur preussischen Geschichte*, 1936; J. A. R. Marriott and C. G. Robertson, *The Evolution of Prussia* (revised ed.), 1937; P. Gaxotte, *Frederick the Great*, 1938; G. O. Volkmann, *Die preussische Revolution*, 1940; E. Stern-Rubarth, *Exit Prussia*, 1940; E. Eyck, *Bismarck*, 1941; and G. P. Gooch, *Frederick the Great*, 1947.

Prussia, East, see EAST PRUSSIA.

Prussia, West, see WEST PRUSSIA.

Prussian Blue, $\text{Fe}_4(\text{Fe}(\text{CN})_6)_3$, dark blue solid which is precipitated by the addition of potassium ferrocyanide to a solution of a ferric salt. It is insoluble in water and dilute acids, but is acted on by alkalis. Commercially it is prepared by oxidising a mixture of ferrous sulphate and yellow prussiate of potash or potassium ferrocyanide. As a dye it has been superseded by aniline products, but it is still used as a pigment in water-colour painting.

Prussiates, salts of prussic or hydrocyanic acid. Yellow prussiate of potash or potassium ferrocyanide is a lemon-coloured crystalline solid made from potassium carbonate, scrap iron, and nitrogenous waste. It yields a deep blue precipitate (Prussian Blue (q.v.)). Red prussiate of potash, or potassium ferricyanide, is an orange-coloured solid made by passing chlorine through a solution of potassium ferrocyanide, and is used in the making of blue-prints.

Prussic Acid, see HYDROCYANIC ACID.

Prut, see PRUTH.

Prutenic Tables, astronomical tables, based on the Copernican system, drawn up by Reinhold in the sixteenth century, and dedicated to the duke of Prussia, whence the name 'prutenic.'

Pruth, or Prut, riv. of the U.S.S.R., and trib. of the Danube, flows for 360 m. between Rumania and Bessarabia, from the Carpathian Mts. It joins the Danube on the left below Galatz. Total length, 500 m. Drainage area, 10,700 sq. m. It was the scene of battles in 1944 between the Russian armies of Marshals Zhukov and Konev and the Ger. and Rumanian armies under Manstein. See under EASTERN FRONT OF RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR.

Prutoth, basic factor in the Israeli system of coinage. Cupro-nickel coins are struck to the value of fifty or a hundred P. In June 1949 the fifty-P. coin corresponded in value to the Eng. shilling.

Pruvium, see PROVINCS.

Pryde, James (1866–1941), Scottish painter, b. in Edinburgh. He was an imaginative artist, his appeal being both emotional and decorative. His art verged on fantasy and occasionally exhibits a touch of the genius of Blake. Little recognised, except by other artists, during his lifetime, he became regarded after his death as one of the few great romantic painters of the twentieth century. The theatre markedly influenced his style, which also displays a tendency to the macabre. In the sensitive 'Miss Jessie Burnet' and the humorous 'Dr. Pryde' he showed himself a master of imaginative portraiture. His finest paintings include

'Romantic Landscape,' 'The Unknown Corner,' and 'The Slum.' These represent the most striking of his variations on the architectural theme. Through such work he strongly influenced such painters as Orpen and Nicholson. His work, however, varied in quality; some of it was merely repetitive and had been anticipated by Guardi, Piranesi, and Wm. Kent. See life by D. Hudson, 1949.

Prynne, William (1600-69), Puritan antiquarian and pamphleteer, b. at Swainswick, educated at Bath Grammar School, and matriculated from Oriel College, Oxford, in 1618, graduated B.A. in 1621, admitted student of Lincoln's Inn the same year, and was called to the Bar in 1628. P. is chiefly remembered for his *Histrio-Mastix* (1632), a work against stage plays; for a supposed reflection in it upon the queen, Henrietta Maria, he was prosecuted, committed to the Tower, fined £5000, expelled from the univ. and from Lincoln's Inn, ordered to stand in the pillory, and to lose both ears. He was at various times fined and imprisoned for his writings, which number fully two hundred. On the assembly of the Long Parliament he petitioned for redress, and the House declared his sentence illegal, and voted him £4000 by way of reparation. He sat in Parliament for Newport in Cornwall, but he opposed Cromwell's party, regarding the commonwealth and protectorate as illegal, being bitterly opposed to sectarianism and the levellers, and sided with the king. After the Restoration he sat for Bath. He was appointed keeper of the records in the Tower on which he did considerable research and pub. some important material. Historians increasingly stress his importance as an antiquarian of some scholarship rather than as a political pamphleteer. See E. W. Kirby, *William Prynne*, 1931.

Pryotelsrak, Eskimo name for motorboat, replacing increasingly the umiak (q.v.) in N. waters.

Przycoc, see PRYCEC.

Przemysl, fortress, in Galicia, Poland, on the San, just W. of the Curzon line, 56 m. W. of Lwow. It is a Rom. Catholic and a Gk. sec. It trades chiefly in grain, wood, and machinery. During the First World War the Russian forces under Gen. Ruzsky swept over this region in Sept. 1914, and when Lwow fell the Austrians, under von Auffenberg, withdrew into P., which was soon invested. It was relieved very soon by Austro-Ger. forces, who in turn were driven back and the place again was invested. It sustained a siege of five months, and did not surrender until March 22, 1915. In May 1915 Austro-Ger. forces, under von Mackensen, commenced an offensive against the Russians, who were forced back beyond the San. In this region the Russians made P. the centre of their line, but Mackensen attacked it on both flanks, causing them to evacuate it on June 1, from which time it was free from Russian occupation. P. fell to the Gers. in the invasion of Poland in 1939. It was captured by the Russian marshal Konev, in his great S. advance, on July 28, 1944. Pop. 52,000.

Psalmody, in its widest sense, signifies the Psalms of David set to music and sung. Frequently, however, the term is restricted so as to exclude all but the metrical versions of the psalms to which short grave airs are either set or adapted. The practice of psalm-singing in the Christian Church dates from its very beginning, and the Psalms have always formed the basis of public devotions. The Psalms were not turned into metre until after the Reformation. Until then the use of Lat. made popular singing impossible. The claim of the reformers that the people had the right to sing in their own tongue, and to simple melodies, necessitated the use of metre which illiterate people could commit to memory, along with tunes of the requisite simplicity. Metrical P. was for centuries in use in all the reformed churches. It died out in England in the mid nineteenth century. In Scotland and in churches of the same tradition it still continues, along with hymns, in the 1650 Scottish version. The poetical quality is necessarily very inferior to the stately Eng. prose. In the Rom. Church metrical P. has never been used. See J. Julian, *Dictionary of Hymnology*, 1892, and M. Patrick, *Four Centuries of Scottish Psalmody*, 1949.

Psalms, Book of, in modern Heb. Bibles begins the third section of the O.T. canon, that of the writings or hagiographia. In the Septuagint version it comes second in this group. The Heb. title is 'Songs of Praise,' the word 'psalms' being taken from the Septuagint rendering *psalmoi*. In each version the Psalms are 150 in number, though they are differently divided. The Septuagint has also a 151st Psalm ostensibly Davidic, but frankly recognised as an addition to the original book. In the Heb., as in the R.V., the psalter is divided into five books, viz. Ps. i.-xli., xlii.-lxxii., lxxiii.-lxxxix., xc.-cvi., and cvii.-cl. The close of each of the first four books is marked by a kind of doxology. Most of the psalms have titles, some of which ascribe the composition to some author such as David or Asaph, while others denote the occasion of composition and others the manner in which the psalm is to be sung or accompanied. Some of these latter terms, such as Selah and Hallel, are very obscure. The Psalms consist of poetic outpourings of devotion to God, deeply spiritual in character, and showing every aspect of the religious character. Their depth and catholicity have thus made them worthy to hold the position they have ever held in the services not only of the Jewish but also of the Christian Church. A most important question with regard to the psalms is their authorship, and with this is closely bound up the question of their date. It is an ascertained fact of criticism that the historical ascriptions are not trustworthy. This may be seen, on an examination of those psalms attributed to David, the founder of Heb. psalmody. In these are found not only the use of conventional terms, but also borrowing from other psalms. Style and vocabulary prove some of them to be late, while in others the existence of the

Temple seems to be pre-supposed. Generally the Psalms may be said to be modelled on the prophets, and therefore to be later than these. Very few of the Psalms can be said to be earlier than the seventh century B.C. S. R. Driver, in his *Introduction to the Literature of the Old Testament* (8th ed.), gives the following as pre-exilic: Ps. ex., cl. xcl., xc., and lxxiv. The bulk of the Psalms, however, are post-exilic, and many of them (e.g. lxxiv., lxxix.) belong to the period of the Maccabees. See also **PENITENTIAL PSALMS**. See J. P. Peters, *The Psalms as Liturgies*, 1922; A. C. Welch, *The Psalter in Life, Worship, and History*, 1926; N. H. Snaith, *Studies in the Psalter*, 1934; and W. O. Vesterley, *A Fresh Approach to the Psalms*, 1937.

Psaltéry, obsolete instrument of the dulcimer type, triangular in shape and with strings stretched across its frame harp-wise, which were played with the



PSALTÉRY

bare fingers or with a plectrum. It became extinct during the seventeenth century. It is usually used in the Bible to translate the Heb. *nēbēl*.

Psammetikhos, or **Psammetichus**, see **EGYPT, History**.

Psammite Rocks (*psammos*, sand), gravelly and sandy rocks. See **SANDSTONE**; **GRAVEL**, etc.

Pseudomorphism, assumption by a mineral of a form other than that which really belongs to it. Pseudomorphs may generally be recognised by the absence of sharpness in the crystal angles, while the faces usually present a granular, dull, or earthy aspect. Pseudomorphs may be formed in sev. ways, such as (1) by *infiltration*, when the cavity previously occupied by a crystal is refilled by the deposit of different mineral matter from the infiltration of a solution; (2) by *investment*, or a superficial encrustation of one mineral on the crystal of another; (3) by *replacement* which is a slow and gradual substitution of particles of new and different mineral matter for the original particles, which are successively removed by water or other solvents; and (4) by *alteration* or the gradual chemical change which crystals sometimes undergo, their composition becoming so altered that they are no longer the same minerals, although they retain their old forms.

Pseudonym, term used to denote a fictitious name (or *nom de plume*) adopted by an author, and, though less frequently, the pseudonymous work itself. From the earliest times various writers have for different reasons produced works under Ps. In former ages the chief reason was political, the pub. of works or articles attacking the existing order of things or

unpopular institutions being in the highest degree dangerous. Posterity has never yet satisfactorily pierced the identity of 'Junius,' which P. has been variously assigned to Lord Temple, Sir Philip Francis, Richard Glover, and many others; while François Marie Arouet has never been known by any other name than 'Voltaire.' At the present time, except in countries where the free expression of opinion is still fraught with serious consequences, the adoption of Ps. is resorted to either for private reasons, or as a pure literary conceit. Many actors and actresses also adopt Ps., the reason apparently being to find a more glamorous name, although the custom may have originated from the time when acting was considered a vulgar profession. Sir Henry Wood composed music under the P. of Paul Klenovsky, thinking that a Russian name would receive a better hearing than an Eng.

Some famous Ps. include:

Adler, Max, Charles Heber Clarke; A. E., George W. Russell; *Anstey*, F. T. Anstey Guthrie; *Bab*, Sir W. S. Gilbert; *Beachcomber*, J. B. Morton; *Bell*, Currier, Ellis, and Acton, the Brontë sisters; *Byblow*, Hosca, James Russell Lowell; *Billings*, Josh. H. W. Shaw; *Birmingham*, George, Canon J. O. Mannay; *Boven*, Marjorie, Margaret Long; *Bos*, Charles Dickens; *Bridle*, James, O. H. Mavor; *Carmen Sylva*, Elizabeth, queen of Rumania; *Carroll*, Lewis, C. L. Dodgson; *Chase*, Beatrice, Olive Katharine Parr; *Conrad*, Joseph, J. C. Korzonowski; *Corno di Bassetto*, George Bernard Shaw; *Cornwall*, Barry, B. W. Procter; *Dagodel*, G. R. Sims; *Dane*, Clemence, Winifred Ashton; *Draper*, M. H., Dean Swift; *Elia*, Charles Lamb; *Eliot*, George, Marian Evans Cross; *Fongasse*, C. K. Bird; *France*, Anatole, J. A. Thibault; *Gorki*, Maxim, Alexei Peshkov; *Hamsun*, Knut, K. Petersen; *Hay*, Ian, John Hay Beth; *Henry*, O., W. S. Porter; *Hobbes*, John Oliver, Mrs. Craigie; *Hop*, Anthony, A. H. Hawkins; *Iconoclast*, Charles Bradlaugh; *John o' London*, Robert Lynd (later Frank Swinnerton) and Wilfred Whitten; *Loli*, Pierre, J. Viaud; *Ludwig*, Emil, E. L. Cohn; *Markenzie*, Compton, M. Compton; *Maurois*, André, Emile Herzog; *Merriman*, Henry Selon, Hugh Stowell Scott; *Molière*, J. B. Poquelin; *Novalis*, Fr. V. Hardenberg; *Orzcy*, Baroness, Mrs. Montagu Barstow; *Ouida*, Louise de la Ramée; *Pertinax*, André Gérard; *Peterborough*, H. E. Wortham; *Phiz*, Hablot Knight Browne; *Q*, Sir A. T. Quiller-Couch; *Romains*, Jules, Louis Farigoules; *Rowley*, Thomas, Thomas Chatterton; *Rutherford*, Mark, Wm. Hale White; *Sand*, George, Mme. Dudevaux; *Sapper*, H. C. McNeill; *Sinjohn*, John, John Galsworthy; *Stendhal*, Marie Henri Beyle; *Taffrail*, Henry Tappell Dorling; *Twain*, Mark, Samuel L. Clemens; *Voltaire*, François Marie Arouet; *Ward*, Artemus, C. F. Browne; *Y. Y.*, Robert Lynd. Collections of Ps. include: A. Franklin, *Dictionnaire des noms, surnoms et pseudonyms latins de l'histoire littéraire du moyen âge*, 1876; S. Halkett and J. Laing, *Dictionary of Anonymous*

and *Pseudonymous Literature of Great Britain*, 1883-88; E. Weller, *Lexicon Pseudonymorum*, 1886; W. Ousling, *Initiale and Pseudonyms*, 1886; P. G. Brunet, *Dictionnaire des ouvrages anonymes*, 1889; F. Audet, *Pseudonymes canadiens*, 1936; and H. Ehrencron-Müller, *Anonym-og Pseudonym-Lexicon*, 1939.

Pseudopodia, see ΔΜΟΒΑ.

Psilomelane (Gk. ψῖλος, smooth, and μέλας, black). Hydrated oxide of manganese with or without varying amounts of barium and potassium. There is no crystalline system. Its common form is amorphous, botryoidal, massive, reniform, and stalactitic. It is iron black in colour, passing into dark steel grey. There is a brownish-black streak, and a submetallic and opaque lustre. The hardness is 5-6, and sp. gr. 3.7-4.7. It occurs mainly as sedimentary or residual deposits. P. is a source of manganese used in the manuf. of alloys.

Psilorati, see IDA, MOUNT.

Psittaci, see PARROT.

Psittacosis (Lat. *psittacus*, from Gk. πσιττακος, parrot), virus disease of parrots which acquired prominence in 1930 when the infection was transmitted from parrots to human beings in England and other countries. The symptoms resemble those of typhoid, or of a pulmonary disease. P. is frequently fatal in humans: it is being treated experimentally with aureomycin.

Pskov, or **Pleskov**, name of a region and its cap. in the R.S.F.S.R., and of a lake (50 m. long and 13 m. broad) partly in that region and partly in the Estonian S.S.R., being a S. extension of Lake Peipus. Mainly low-lying, with higher ground in the S. and S.E. and over 800 lakes, the region is drained by the Shelon and Lovat flowing to Lake Ilmen and the Velikaya flowing to Lake P., whilst the Dvina runs for 100 m. along the S.E. borders. In spite of the vast tracts of forest (birch, pine, and aspen) and marshes, flax, oats, rye, etc., are extensively cultivated. The lumber trade is important. It was captured by the Gers. in Feb. 1918, just before the treaty of Brest-Litovsk. The area is 16,678 sq. m. Pop. 2,000,000.

The tn. of P. lies on the banks of the Velikaya, 9 m. S.E. of Lake P. The cathedral and kremlin still bear witness to those days of prosperity when, like Novgorod, the city was an independent and republican community, besides a member of the Hanseatic League. There are tanneries, and it trades in hemp, flax, and timber. P. has suffered by being a border city in a strong strategic position. The main part of the city with its kremlin and the ruins of its formidable medieval ramparts, stands on the E. bank of the Velikaya at the head of the composite waterway linking it with the gulf of Finland. It was founded in the eleventh century as an outpost colony of Novgorod, but in the fourteenth century it gained its independence which it did not lose until the little republic was absorbed by Basil III. of Moscow in 1510. Before 1914 it was not only the terminus of the important

railway from Orel along which Ukrainian wheat was exported, but also a naval base. In the Second World War it fell to the Gers. on Aug. 8, 1941, and was held by them for nearly three years. During the spectacular Russian advance of 1944 it became essential to Russian strategy to prevent the Gers. guarding Estonia from retreating on E. Prussia and this involved the capture of P., which was effected on July 23. Pop. 58,800. See further under EASTERN FRONT or RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR.

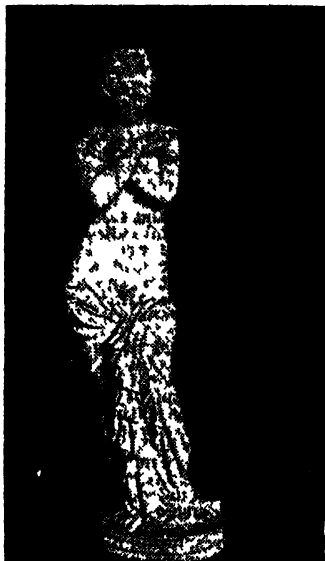
Psoriasis, skin eruption, the cause of which is unknown. It has a localised distribution, appearing especially in the elbows and knees, and adjacent parts of the limbs, and consists of very scaly patches which often become chronic.

Treatment.—For *acute* P. considerable caution is called for, and local application of calamine lotion, and salicylic acid and zinc oxide ointment; for *chronic* P. arsenio internally and a tar and salicylic acid ointment locally, after the scales have been removed. Desquamation may be promoted by treatment with ultra-violet rays.

Psychasthenia, form of psychoneurosis (q.v.) characterised by a generalised lowering of nervous tension and therefore of the general level of psychological performance. Janet used the term to describe one of the two groups (hysteria was the other) into which he subdivided psychoneurosis, and under it he included obsessions, compulsions, fears of all kinds, states of doubt and indecision, and feelings of fatigue. He suggested that in these cases the interference with volitional behaviour by irresolution and doubt, and the compulsion towards meaningless acts, which the patient has great difficulty in controlling despite the fact that he has good insight and recognises his symptoms as being morbid, were due to an inherent failure to achieve apperceptive synthesis. The absence of harmonious integration between the cognitive and the affective-conative functions would thus explain the lack of interest, the difficulty in sustaining attention, the absence of energy, and therefore the inability to act. Most modern authorities believe, however, that the condition is due to conflict causing a disruptive dissociation and regard Janet's views as being descriptive rather than explanatory. See M. Craig and T. Beaton, *Psychological Medicine*, 1926; R. G. Gordon, D. T. Harris, and J. R. Rees, *An Introduction to Psychological Medicine*, 1936; and D. K. Henderson and R. D. Gillespie, *A Text-book on Psychiatry* (6th ed.), 1944.

Psyche (Gk. ψυχή), in Gk. legend, the youngest of a king's three daughters, Aphrodite, jealous of P.'s beauty, ordered Cupid (Eros) to inspire P. with a love for the most contemptible of men; but Cupid himself fell in love with her. Unseen and unknown, he visited her each night. Her jealous sisters told her that in the darkness she was embracing some hideous monster, and P. therefore shone her lamp on Cupid while he slept, and saw the most beautiful of gods. Cupid awoke, censured her for

her mistrust, and fled. P. set out to look for Cupid and eventually was united to him for ever, becoming immortal. In this story P. represents the human soul, which is purified by suffering and misfortunes, and thus prepared for happiness.



Lowry

'PSYCHE,' BY J. PRADIER

Psychiatry, branch of medicine which deals with mental ill health, however produced. The way in which mental illness is treated reflects the theories which are held about it. For instance, the belief that mental illness was due to demonic possession led to its treatment by some method of exorcism. Modern concepts emphasise the interdependence of body and mind and particularly the close connection between the activity of the brain and that of the mind. Modern treatment employs physical methods to alter the activity of the nervous system and, through that, of the mind, and psychological methods which deal with the mind directly. Some forms of mental illness respond better to one, some to the other, while many patients do best with a combined approach.

The classification of mental illness presents considerable difficulties. It may be classified according to the alleged cause, the obvious symptoms, or the physical disease of the brain with which it is associated. A convenient classification is as follows: (1) conditions of incomplete development, idiocy, imbecility, and feeble-mindedness, either primary, due to some defect of the germ-plasm, or second-

ary, due to environmental cause operating before, during, or after birth, with arrest of the development of the brain and mind; (2) conditions of mental disorder, the psychoneuroses (see *PSYCHONEUROSIS*) and psychoses (see *PSYCHOSIS*); (3) conditions of mental decay: the various types of dementia.

The dividing lines between these groups are by no means definite, e.g. the feeble-minded may be psychoneurotic or psychotic, and in the group of organic psychoses, including general paralysis of the insane, the psychoses due to alcohol, etc., dementia may be a prominent feature.

Treatment of Mental Illness—Where physical factors are of major importance in the causation, treatment is largely that of the underlying physical cause e.g. the treatment of general paralysis of the insane with malaria and penicillin, the treatment of psychoses occurring in myxedema (a disease of thyroid deficiency) with extract of the thyroid gland. Physical methods of treatment are described under *psychosis* (q.v.). Drugs are used mainly to decrease anxiety and restlessness and to procure sleep. Certain drugs such as amphetamine sulphate are used as stimulants e.g. in depressive illnesses. Many patients, particularly those with mild anxiety states respond well to rest in bed. In severe restlessness and excitement, e.g. mania, continuous baths at body temp are useful. Many patients refuse food and it is necessary to ensure that they get sufficient.

Psychological Treatment and Psychotherapy—The object is (1) to modify the environmental factors in order to provide satisfactory environmental conditions when possible; (2) to produce such a change in the patient that he can readapt himself to his environment with, when possible, an increased understanding of himself and his illness.

(1) Admission to hospital is, of course, a major alteration of environment and can be handled so as to prove of great benefit. It may be necessary to remove a patient from an environment often the home, which is not suitable. Occupational therapy, the organised provision of an occupation suitable to the patient, is of the highest value in the treatment of both hospital and out patients. Trained psychiatric social workers are invaluable, for example, making contact with a patient's home and employers, in adjusting home and working conditions where necessary, and in helping patients to find suitable clubs and other social activities.

(2) Minor psychotherapy uses simple explanation and discussion of problems, and of the nature and origin of the illness, and is often combined with reassurance. Suggestion may be given indirectly by the whole atmosphere of consulting room and hospital, by the physician's personality, and sometimes in the use of inert medicines; or directly with the patient, either fully conscious or hypnotised. Suggestion is particularly effective in the hypnotic state (see *HYPNOTISM*). Major psychotherapy includes those

analytical methods which aim at a complete understanding of the patient by himself. It is indicated for some of the more complex and severe psychoneurotic illnesses and has been used occasionally in some psychoses. Treatment is very prolonged and expensive and is therefore not available to all who might be expected to benefit from it. There are sev. schools of major psychotherapy, the best known being the psychoanalysis of Freud (*q.v.*), the analytical psychology of Jung (*q.v.*) and the individual psychology of Adler.

Many mental illnesses can be traced to emotional conflicts having their origin in early childhood, and the work of child guidance clinics is of great prophylactic importance. In these clinics, the number of which is steadily increasing, the work is carried out by a psychiatrist, a psychologist, and a social worker as a team. Together they arrive at an estimate of the handicaps and possibilities of the child and are able to give advice and treatment accordingly. See D. K. Henderson and R. D. Gillespie, *A Text-book of Psychology* (6th ed.), 1944; J. D. Campbell, *Everyday Psychology*, 1916; D. Curran and L. Guttmann, *Psychological Medicine*, 1947; and A. F. Tredgill, *A Text-book of Mental Deficiency* (7th ed.), 1947.

Psychical Research, or Parapsychology. scientific study of the facts and causes of mediumistic and other alleged supernormal phenomena beyond consciousness. Such phenomena as yet unexplained by known laws include telepathy, clairvoyance, hypnosis, hallucinations, dream fulfilment, divining, miraculous cures, and hauntings. It is clear that these investigations are important, since, if the phenomena are satisfactorily established, our ideas of life, personality, and mind (perhaps even of space, matter, and time) are inadequate, and must be modified to include the new facts. For the evidence for telepathy and hypnosis see separate articles. The evidence for rhabdomancy or 'dowsing,' the divination of water and other minerals by means of a twig, suggests that the explanation is not physical, but that the dowser possesses the faculty of clairvoyance. P. R. has also been applied to spiritualistic phenomena, such as spirit messages, automatic writing, and materialisation (see under SPIRITUALISM), and to the investigation of haunted houses, poltergeist disturbances, and similar phenomena.

Organised P. R. originated with the foundation of the Society for P. R. in 1882; past presidents include Wm. James, Sir Wm. Crookes, Sir W. Barrett, Henri Bergson, Sir Oliver Lodge, C. D. Brand, Lord Rayleigh, and H. H. Price. The society includes among its members many men and women of great eminence in the world of science and letters. Other societies with similar aims include the Amer. Society for P. R. and the Institut Métapsychique International in Paris. Harry Price (*q.v.*) founded in 1925 the National Laboratory for P. R., the first laboratory equipped for such a purpose in Great Britain. The Perrott Studentship in P. R. has been estab. at Trinity College,

Cambridge, and the Blennerhasset Trust with the same object at New College, Oxford. There is also the Hodgson Fellowship in P. R. at Harvard Univ., and an International Congress of P. R. meets occasionally in various parts of the world. See also under PSYCHOLOGY. See W. J. Crawford, *Reality of Psychic Phenomena* (2nd ed.), 1919; F. A. Schrenck-Notzing, *Phenomena of Materialisation*, 1920; Sir W. Barrett and T. Besterman, *The Divining Rod*, 1926; T. Besterman, *Inquiry into the Unknown*, 1936, and *Some Modern Mediums*, 1937; G. N. M. Tyrrell, *Science and Psychological Phenomena*, 1938; R. L. McGro, *Dream World: a Survey of the History and Mystery of Dreams*, 1939; H. Price, *Fifty Years of Psychological Research*, 1939, and *Poltergeist over England: Three Centuries of Mischievous Ghosts*, 1945; S. Sitwell, *Poltergeists*, 1940; W. Carington, *Telepathy*, 1945; L. M. Le Cron and J. Borden, *Hypnotism To-day*, 1947; J. B. Rhine, *Search of the Mind*, 1948; also the *Proceedings and Journal of the Society for P. R.*

Psychoanalysis, name given to the special technique discovered by Sigmund Freud (*q.v.*) for the exploration of the mind in search of those repressed thoughts and ideas of which the subject is unconscious.

According to the psychoanalysts, many forms of mental disorder are to be regarded as the consequence of conflict between repressed and unconscious ideas and conscious thoughts; the abnormal conduct which accompanies the disorder being the expression in action of these unconscious ideas. Freud's doctrines have developed, in particular, from his studies of dreaming. Dreams, he claims, are dramatizations of unconscious wishes, made possible only through the relaxation in sleep of the conscious system of ideas and thoughts. In waking life the conscious system is able to repress with greater completeness any expression of the unconscious system in thought, and even in sleep it exercises the role of a 'censor,' restricting expression to forms which appear meaningless when recalled and scrutinised. Most people dream but most people are not mentally disordered. The distinction between the normal and the psychoneurotic individual is, therefore, not that the latter alone has an unconscious region of his mind but that it is in some way disturbing his behaviour in such a way as to reduce his happiness and his social effectiveness. The object of the psychoanalytic therapy is to restore him to happiness and social usefulness by making him aware of the unconscious forces which are disorganising his conduct and so enabling him to bring them under voluntary control. This insight into the previously unknown causes of his illness is gradually gained during a series of sittings with his analyst lasting generally many months. The length and cost of the analytic method of cure very severely limits its general usefulness, and more rapid methods of treatment are often employed, although Freud himself condemned the attempt to accelerate the process of P.

The causes of psychoneurotic disorders

are very generally found to lie in early emotional relationships with the parents. The typical form of this relationship (called the Oedipus complex in the case of male patients and the Electra complex in the case of females) is a strong emotional attachment to the parent of the opposite sex and jealousy and hatred of the parent of the same sex. Both the love and the hate are normally unconscious and the conscious attitudes may be very different. The unwillingness of the patient to recognise this source of his troubles is attributed by Freud to repression, the active banishment of the system of feeling from the conscious mind into the region of the unconscious. The cure depends on the removal of this repression and the consequent emergence of the repressed system into the conscious mind where it can be dealt with in a rational manner.

The use of the term repression in trans. of Freud's works has led to a widespread misunderstanding in which he is supposed to be using the term not in the severely technical sense of psychoanalytic theory but in the more popular sense of forbidding people to do what they want. Thus it is thought that Freud taught that men would all be mentally healthy if they were allowed to do what they liked, and that, in particular, children should not be prohibited from doing what they want to do. This was far from his thought. Freud considered that the prohibition of primitive impulses was a necessary condition for the development of civilisation. Nor does P. give any support to the curious idea that mothers should refrain from kissing their sons lest they should develop an Oedipus complex. Freud thought, on the contrary, that the love relationship between parent and child was a necessary part of the healthy emotional development of the child. It was the concomitant development of hatred and the banishment of the whole system into the unconscious that he regarded as harmful.

The psychoanalytic method has been found valuable in the treatment of some forms of neurosis, although others are resistant to it. As a method of treatment of the psychoses or insanities it has not been found generally successful, although it is undoubtedly helpful in providing a theory of their causation. The understanding of the causation of disorders of behaviour provided by P. has been found of great value in the treatment of delinquents by Aichorn and others, even when the use of the full psychoanalytical technique is not possible.

P. is not, however, merely a system of therapy. Its acceptance leads to concepts of the mind and of mental processes which in turn result in new views of many forms of human activity. Thus psychoanalysts have investigated problems of the social conduct of men—customs (dress, totem and taboo, religious ritual, political action, etc.); of art; of education; of literature and primitive story-telling. In every one of these fields it has shed much light. At first the new views pro-

voked a great deal of opposition, but they are now receiving the general approval of orthodox psychological and medical authorities. See the works of Freud, in general, especially *Introductory Lectures on Psychoanalysis* (Eng. trans.), 1934, *An Outline of Psychoanalysis*, 1949 and *Three Essays on the Theory of Sexuality*, 1949; (i. Rohelm, *Psychoanalysis and the Social Sciences*; A. Alohorn, *Wayward Youth*, 1936; E. Glover and M. Brierley, *An Investigation into the Technique of Psychoanalysis*, 1940; G. Richard, *La Psychologie et les problèmes psychiques et moraux*, 1946; E. Jones, A. Brill, etc., *Psychoanalysis To-day*, 1946; and A. Freud, *The Psychoanalytic Treatment of Children*, 1947.

Psychology may be broadly defined as the science of mind. The word is derived from the Gk., and means the science of the soul. In ancient and medieval times P. was regarded as a branch of philosophy dealing with the principle of life, sensation, intelligence, and conation, especially in human beings. It was essentially speculative and static, in contrast to the modern practical and dynamic study of P. The chief psychological theses of the scholastics included the unity and unifying power of the soul, its essential connection with the body, its spirituality and immortality, the freedom of the will, and the dependence of the intellect upon sense data. Modern P. is, however, regarded as a branch of experimental biology. It may be defined as the science of mind or, more specifically, as the positive science of human behaviour and thought. Its predominantly experimental character has led to a decline of interest in such purely speculative questions as that of the relation of mind to body. It is known that mental processes are related to changes in the nervous system but the experimental psychologist is inclined to be little interested in whether this relation is one of parallelism or of mutual interaction. The tendency of physiological P. has generally been to favour the former view, or to regard both psychical and physiological events as different aspects of the same series of events. On the other hand, there are still exponents of the interactionist view that psychical events act on the nervous system and are acted on by events in the nervous system. Generally the experimental psychologist is impatient of such problems which affect little if at all his actual observations, and he is inclined to suspect that the existence of such questions is merely due to the inadequacy of language to express relationships of an order so remote from the problems of practical life with which language was designed to deal.

The idea of applying the method of scientific experiment to the problems of the mind arose about the middle of the nineteenth century with measurements of the least difference of a light or other stimulus which could be just perceived as a difference in sensation. Soon afterwards the physiologists were studying the sensations of colour and sound, while Ebbinghaus was making studies of the rate of forgetting of nonsense syllables.

In 1879 the first psychological laboratory was founded at Leipzig Univ. These earlier researches were dominated by the atomistic ideas of the pre-scientific associationist P. The method for P. was regarded as that of finding the simple elements out of which the complex processes of the mind were made up. Thus thought was regarded as a chain of simple ideas linked together by bonds of association, and perceptions were regarded as compounds made up of elementary sensations. The cramping effects of this system of ideas were overcome by the Gestalt psychologists (Wertheimer, Kohler, and Koffka) at about the time of the First World War, and experimental P. was enriched with a large number of researches in which for the first time the complex processes of thought and perception were studied as realities in their own right and not as mere aggregations of simpler elements.

A problem which early attracted attention in P. was that of the nature of learning. Thorndike conducted experiments on animals learning to get out of puzzle boxes and concluded that their learning was due to the mechanical operation of the Law of Effect—that the cat tries all sorts of behaviour at random, and that any bit of behaviour that happens to succeed is more likely to occur next time, while those bits of behaviour followed by failure are less likely to recur. Later researches (such as those of Kohler on chimpanzees learning) make it clear that insight or understanding of the situation is an essential part of learning, and it is now clear that even the learning of a cat is not so blind and mechanical a process as Thorndike had supposed. In considering the application of P. to education it is particularly important to avoid the view of learning as a mechanical stamping in of right responses and to consider it rather as a matter of progressive understanding.

One part of work in P. followed the tradition of the Ger. laboratories and was concerned primarily with the establishment of general laws of human P. A totally opposed tradition was started in England by Sir Francis Galton in which the centre of interest was the difference between individuals. The study of individual P. was particularly taken up by the Amer. psychologists. Its most important advance came, however, from the work of Binet in France who made the first practical series of intelligence tests as a means of measuring the relative general intellectual capacities of different individuals. Binet's scale of intelligence tests was much improved by Terman in America and is now used for the clinical measurement of intelligence differences, particularly for the detection of mental defect (see MENTAL TESTS). Other forms of intelligence test are used for distinguishing the children with sufficient intellectual capacity to profit by a grammar school education. Another important advance in P. came not from the psychological laboratories but from the doctor's consulting room. Early in the present century Freud (q.v.) brought

forward a revolutionary theory of the nature of the unconscious mind, generally called the theory of psychoanalysis (q.v.). This theory opened new vistas of the determination of human behaviour which have had important influence both on psychological theory and practice. Important modifications of psychoanalytic theory as well as changes in the technique of treatment have been made by Jung, Adler, Reik, and others.

An important branch of P. of relatively recent development is that of social P. Early experiments in P. treated the individual as an isolated unit, ignoring the influence of the social setting. In some experiments, such as those on suggestion, the influence of the social situation became obviously of paramount importance. Social P. may be defined as the scientific and experimental study of the individual in his relationship with other individuals and with social groups. Such problems as anti-semitism, class conflict, re-education of delinquents, conditions of harmonious relationship within industry, military discipline, etc., all obviously belong to this branch of P. So, to a large extent, do the problems of character and of school education. Lewin has devoted himself to the task of developing concepts adequate to the problems of social P. In this development P. is obviously related to the sciences of sociology and anthropology, as the earlier experimental P. was related to physiology.

The development of the theory of intelligence testing required new mathematical techniques. The discovery of statistical methods originally by Galton and developed by Pearson and Fisher has made possible the adequate treatment of quantitative results in P. which would otherwise have been impossible. From the relatively simple use of correlation coefficients by early workers on testing has developed the use of matrix algebra in factor analysis which puts this branch of psychological study beyond the grasp of those without special mathematical knowledge. This is one example of the fact that modern P. is inclined to be a somewhat difficult branch of study. Psychologists are often blamed for adopting a technical jargon which obscures their meaning from a lay reader. This, however, is a necessity arising from the fact that the science of P. is dealing with concepts which have generally no place in ordinary everyday thought, and that therefore there are no generally understood words for them. Scientific P. is in no different case from any other science; the uninitiated reader would find it difficult to read a modern text-book on physics or chem. In order to understand any science a student must learn its technical language. Even the student of P. may, however, be exasperated at discovering that he must learn many technical vocabularies—that of psychoanalytic theory, for example—as well as that of learning experiments and mental testing. It must be remembered, however, that P. is a young science, and complete agreement in technical vocabulary is unlikely so long as

new ranges of fact are being assimilated. It is to be hoped that this will be only a transitory situation.

The success of the intelligence tests led psychologists to hope that equal success would be obtained in testing qualities of character (or personality). This proved to be a much more difficult task. It is not obvious along what particular lines character should be tested in order to give the maximum amount of information. If one measured all traits of character distinguished by different names, the number would be prohibitively large. There is now general agreement, with minor differences, as to the main character traits which it is convenient to measure. Some of these can be measured by suitably devised tests; some can only be assessed by those who have had the opportunity of seeing the everyday behaviour of the individual in question. The main importance of character testing is in clinical P., where disorders of personality are diagnosed. For this purpose, the most satisfactory kind of tests are found to be those of the 'projection' type in which the person tested is asked to construct a story, make a drawing, or to report the pictures he can see in a formless ink-blot. The mental productions he makes under these conditions can be interpreted by a skilled tester as revealing his peculiarities of personality and his personal problems. Such tests are not easy to apply and need special training and powers of intuitive judgment in the person using them.

The practical applications of P. are now manifold. It is important in education both as providing means of assessing the abilities of children and also of giving guidance as to methods of learning and teaching. Teachers now commonly include a course of educational P. in their training course. Starting from the work of Taylor and Galbraith, there has been increasing application of psychological principles and methods of selection to the problems of industry. The application of industrial P. is, in this country, largely carried out by the National Institute of Industrial P. A closely related practical problem occurs in time of war when much of the energy of psychologists of all countries is devoted to devising and carrying out methods of selection amongst the large number of recruits, of improving methods of drill, and of electing the most suitable officers. Psychological clinics in most educational areas use psychological methods in the treatment of problem children, both as a means of reducing the educational difficulties of such children and also in the hope that early treatment of mental peculiarities may prevent the development of serious mental disorder later. Methods of treating delinquent children have been developed by Homer Lane, Alchorne, and others. These are also influencing the approved schools and other institutions to which convicted children are sent, and it is hoped that early psychological treatment of such children, with an emphasis on re-education rather than punishment, will prevent their

developing into habitual criminals. The Institute for the Scientific Treatment of Delinquency also applies psychological treatment to adult offenders.

New and as yet unsolved problems in P. are raised by the experiments of psychical research (q.v.) (now commonly called parapsychology). The reality of communication between minds without sensory contact (telepathy) was demonstrated as early as 1881 in the early days of the Society for Psychical Research, but they attracted little scientific attention till they were reinvestigated in the parapsychological laboratory of Duke Univ., N. Carolina, under the leadership of J. B. Rhine. It is now clear that parapsychology phenomena are not (as was at one time supposed) limited to telepathy but that there can also be paranormal knowledge of future events and of events not known to any other mind. There has been considerable reluctance to accept these findings amongst psychologists and other scientific workers because they do not fit the system of expectations raised by the naturalistic philosophy which is the generally accepted point of view of the scientific world. On the other hand, it is reasonable to consider them as an important challenge to current psychological theory. Where in any science the unexpected is proved to happen, there is a possible point of advance in theory. The soul as an entity, which seemed to have disappeared from the theory of scientific P., may be found to be required as a necessary hypothesis for the explanation of the facts of parapsychology.

See also CHILD STUDY; EMOTIONS; FEELING; MEMORY; MIND; SUBJECT AND SUBJECTIVE; WILL.

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Psychoneurosis, term applied to conditions characterised by various mental and physical signs and symptoms, for which no physical cause can be demonstrated. It constitutes reactive evidence of a failure in adaptation within the personality. Whereas superficial examination may suggest that the cause lies in the individual's failure to achieve harmonious adjustment to his environment, fundamentally the real trouble is always within the ego itself. An example of this is provided by the case of the soldier who 'breaks down' in war. Here the true-breaking stress is not due to the conditions in battle (whose role is merely precipitant) but to his failure satisfactorily to solve the conflict between his instinct of self-preservation and the demands made upon him by his ideals of duty, loyalty, and self-respect. Thus the existence of psychoneurotic symptoms always implies the presence of mental conflict, and psychotherapy aims at removing them by discovering and solving the latter. Such a conflict, whatever its nature, induces a marked state of deep insecurity, which manifests itself emotionally in the form of anxiety. The symptoms in P. may be either physical or mental, and the former can be sensory, motor, or visceral. The sensory or purely subjective disturbances may occur in any or all of the systems of the body and may take the form of anaesthesias, hyperaesthesias, and paresthesias. Such symptoms, which were regarded at one time as 'imaginary,' are none the less real because they are hysterical. Motor manifestations include paralysis, paresis, tics, tremors, and anomalies of gait and speech. Visceral symptoms include tachycardia, vomiting, diarrhoea, polyuria, etc. Reactions in the mental field include (1) phobias of all kinds, e.g. of heights, enclosed spaces, disease, etc.; (2) amnesia; (3) trance states and somnambulisms; and (4) obsessions. Clinically P. may be subdivided into (1) neurasthenia; (2) anxiety

states (including 'anxiety neurosis' and 'anxiety hysteria'); (3) hysteria; and (4) obsessive compulsive P.

Anxiety states are a form of psychoneurotic reaction characterised by morbid or pathological anxiety. They are the commonest of all the psychoneuroses and fortunately the most amenable to treatment. While the patient may frequently ascribe his condition to some trifling situation or environmental difficulty, the picture as thus presented will be clearly illogical, for the emotional reaction will be obviously out of all proportion to the alleged cause. The real stress or conflict is endopsychic, though the patient may be unaware of its existence or at least of its connection with his symptoms. According to Freud the basis of anxiety neurosis is always in the sexual life, but this theory is not universally accepted. Among the predisposing causes may be included a morbid heredity, a morbid family environment (e.g. maternal anxiety), and an emotionally unstable, timid, worrying type of personality. Any type of external stress (e.g. fear, frustration, or failure in the domestic, financial, sexual, or other sphere), may serve as a precipitating factor. Freud distinguished two types of anxiety state: (1) Anxiety neurosis and (2) anxiety hysteria. The former term he applied to the type of case in which the anxiety is experienced primarily in the mental field, and the latter to conditions in which somatic manifestations constituted the most prominent feature. This classification, however, is liable to lead to some confusion and is not by any means universally accepted or used. The symptoms of anxiety states may be both very numerous and very varied. The mental symptoms include fears of all kinds, from vague inexplicable states of tension and apprehension to specific phobias, in which the fears have become focused on or attached to various objects and situations, and secondary to these fears, irritability, depression, excitability, difficulty in concentrating, faulty memory, intolerance of noise, etc. The somatic symptoms may be referred to any one of the bodily systems, and frequently it is with them that the patient is mainly preoccupied and because of them that he first seeks advice. Palpitation, hyperpnea, dyspnea, dyspepsia, constipation, diarrhoea, tics, tremors, pains of various kinds, and easy fatigability are only a few of the very many forms in which psychosomatic anxiety may manifest itself. Treatment in the first place demands that the patient should be firmly reassured regarding his physical health, and he must be helped to accept such reassurance by a thorough investigation of his physical condition. The true cause of his symptoms is then sought by psychiatric examination and explained to him. Since all psychoneurotic reactions are, to some extent, defence mechanisms against some unpalatable truth, it is not surprising that the most difficult part of the treatment frequently lies in overcoming the patient's 'resistance' to accepting the explanation.

The *obsessional psychoneuroses* are characterised by a continuous preoccupation with some apparently unimportant idea or group of ideas, to the comparative exclusion of most other interests and to the distress of the patient. They may be divided into (1) obsessive ruminative states and (2) obsessive compulsive states. Clinically these are distinguishable by the fact that in the latter the preoccupation manifests itself as a compulsion to some form of activity, which is always symbolic, although frequently illogical or purposeless. Obsessional reactions tend to occur in the intellectual, critical, over-conscientious, and rather introverted type of personality. It is said that it would be difficult to develop an obsessional P. without a relevant constitutional predisposition. The mechanism in the production of the obsessional P. may be explained as follows. There exists in the patient's mind an idea or a wish, which is of such a nature that it is repugnant and intolerable to the super-ego, and whose relevant effect is therefore one of guilt or reproach. The ego endeavours to prevent such an idea from entering consciousness by substituting for it either another idea, which is indifferent in itself, or (in the compulsive variety) an act. The genesis of the condition is therefore a conflict between a wish and a fear. This subterfuge does not, however, enable the patient to get rid of the affect, which now attaches itself to the substitute idea or act, and thereby maintains the latter in consciousness, and accounts for its 'compulsive' quality. The treatment of the milder forms of obsessive rumination and compulsion is the same as the treatment of anxiety states in general. In the severe types of illness treatment is a much more difficult matter and usually some form of analytical psychotherapy is called for. There would appear to be good grounds for believing that psychoneurotic illness is more prevalent than was at one time suspected. It has been stated that at least one-sixth of the hospital out-patients attending the depts. of general medicine, one-third of those receiving benefit under the National Health Insurance Scheme for a month or more, and an even higher proportion of patients seen in general practice, are not suffering from any physical disease but from some form of P. Some authorities, however, claim that the figures are much higher than these. It is indisputable that the loss of time and efficiency due to psychoneurotic reactions must constitute a serious adverse factor in the national economy. See also HYSTERIA; NEURASTHENIA; PSYCHOPATHOLOGY; SHELL-SHOCK. See R. G. Gordon, D. T. Harris, and J. R. Rees, *An Introduction to Psychological Medicine*, 1936; E. Miller, *The Neuroses in War*, 1940; D. K. Henderson and R. D. Gillespie, *A Text-book of Psychiatry* (8th ed.), 1944; and F. Dunbar, *Psychosomatic Diagnosis*, 1945.

Psychopathology. The simplest classification of mental illness is into the psychoses and the psychoneuroses and,

while transitions between these two groups may and do take place, they are nevertheless exceptional occurrences. Considered from the biological angle there are sev. points on which they may be distinguished. In a psychosis a complete or total change in the personality of the patient takes place and his appreciation of reality is qualitatively altered, with the result that his behaviour is correspondingly affected. In psychoneurosis, on the other hand, there is no outward evidence of a personality change, for there is only a part reaction. The appreciation of reality may be diminished (i.e. quantitatively altered) but it remains qualitatively unaffected. In consequence, unlike the psychotic, there is nothing in the behaviour of the psychoneurotic to indicate that the meaning which reality has for him differs in any way from the meaning which it holds for the normal individual. In psychosis the change in reality values may be partly expressed as a projection (i.e. purely subjective experiences may be ascribed to external personal agencies), but projection of this kind does not occur in the psychoneuroses. Neither is speech, as such, disturbed in the latter, but in the psychoses distortion may occur, for here the content of the unconscious finds direct verbal expression. In the psychoses, too, there is frequently a regression to an infantile level of activity, which is not found in the psychoneuroses, except in the absence of clear consciousness. As regards their aetiology, while there is no evidence of direct biological transmission of mental disorders, heredity is believed to play a more important role as a predisposing factor in the psychoses. In the psychoneuroses early environmental influences are regarded as the main determinant, although a neurotic heredity is also frequently present. The psychoses may be broadly divided into organic and non-organic groups, according to the presence or absence of a discoverable physical cause, e.g. in Amentia (mental deficiency) there is a failure in development of the cortical cells; in Dementia they undergo degenerative changes; while in the toxic psychoses these cells and their connections are poisoned by endogenous or exogenous toxins or infections. In the schizophrenic, paranoid, and affective reaction groups, while the exact aetiology is still obscure, a combination of some psychological factor with an hereditary disposition is suggested as the cause. To appreciate the importance of the part which early environmental influences can play in the development of psychoneurosis it must be borne in mind that mental development occurs gradually and progressively as a reactive response to the demands of adaptation, and that the latter fundamentally involves conflict between the instincts and the environment. The instincts are in-born forces and form part of the innate equipment of man and animals. There are probably only two, self-preservation and sex (some include a herd instinct), and the patterns for their expression are either hereditary

or acquired, but some of the former may not mature until after birth. The acquired patterns, in response to the demands of environment, increase both in number and complexity as age increases. Instinctual satisfaction is accompanied by a feeling of pleasure, and in early life it is this so-called pleasure principle which governs all the activities. Later the demands of reality bring about the substitution of the reality principle, which makes possible the abandonment or postponement of the pleasurable attainment. This substitution constitutes the dividing line between the primary phase when all associations are entirely subjective (i.e. undifferentiated consciousness) and the beginning of the development of object consciousness. The first and most important objects differentiated by the child are its parents, but since already an exclusive association has been established with its mother, this entails the recognition of a rival. Here then is its first impact with an environmental obstacle, the peculiarly intimate nature of which creates the ambivalent situation in which love and hate co-exist and contend for supremacy. The partly conscious formulation of an ideal to be like them results from the child's early identification with its parents: it is this fact which renders even their unconscious example such a potent factor in the formation of its habits. This parental training, at first by example only and later by precept as well, is subsequently continued by its teachers and companions, and it is during this training phase that the foundations of its future specific reaction trends as well as its general emotional attitudes are laid down. As its contacts outside the home circle increase, they provide the necessary stimulus for its adaptation to the requirements of society, but success or failure adequately to achieve this can already have been largely preconditioned by the nature of the environmental influences in the home. Meanwhile the personality, which has been described as the synthesis of innate endowments, environmental influences, and the reactive trends resulting from conflicts between these two, is being slowly formed and on the soundness of this synthesis will depend its future stability. Failure harmoniously to integrate these formative factors will later provide the intrapsychic tension underlying some form of psychoneurotic reaction, for psychoneurosis is essentially evidence of failure of adaptation or conflict within the ego itself, which induces a severe sense of insecurity with its attendant emotional state of anxiety. This emotional tension, if sufficiently severe, sets up excessive autonomic and endocrine activity producing symptoms due to disturbances of circulation, digestion, respiration, etc. Displacement of the affect from the original conflict is thus facilitated and a conversion hysteria may result. Or alternatively, with the failure of the mechanism of repression, the brunt of the conflict may fall in the psychic field, and manifest itself as an intense emotional preoccupation ending possibly

in an hysterical amnesia or a fugue. If, however, the partial failure of repression is followed by the substitution for the repressed material of some apparently irrelevant idea or aimless act, to which the affect is displaced, an obsessive compulsive state will result. The personality make-up (and certain other factors) would appear to have some influence in determining the particular type of psychoneurotic reaction that occurs. Thus the hysterical reaction would appear to occur chiefly in the uncritical non-introspective type. On the other hand the obsessive compulsive types of reaction are found mainly in the over-conscious, ultra-critical, introspective and more highly intelligent groups. See R. G. Gordon, D. T. Harris, and J. R. Rees, *An Introduction to Psychological Medicine*, 1936; E. Miller, *The Neuroses in War*, 1940; D. K. Henderson and R. D. Gillespie, *A Text-book of Psychiatry* (6th ed.), 1944; and F. Dunbar, *Psychosomatic Diagnosis*, 1945.

Psychophysics, that branch of experimental psychology (see **PSYCHOLOGY**) which deals with the correlation of mental with physical changes, when physiological conditions are kept constant.

Psychophysiology, that branch of experimental psychology (see **PSYCHOLOGY**) which deals with the correlation of mental events with physiological changes.

Psychosis. The name given to certain serious mental disorders most of which satisfy the legal criteria of insanity (q.v.) in that the patient cannot take care of himself or is a danger to others, or both; in addition psychotic persons show one or more of the following mental abnormalities: (1) loss of touch with or distortion of accepted interpretations of reality, shown, for example, in hallucinations, delusions, or disorders of thought; (2) severe and lasting emotional disorders, e.g. the abnormal elation of spirits in mania, the profound depression of the depressive psychoses, the lack of correspondence between ideas and feeling, and the lack of depth of feeling in schizophrenia; (3) a retreat from normal social relationships to a state of excessive dependence or hostility; (4) a return to infantile habits such as open masturbation, soiling with excreta, etc.; (5) disintegration of the personality so that infantile impulses are given direct or but thinly veiled expression; (6) acute disorders of intellectual function, as in delirious states, or permanent intellectual deterioration in the dementias.

There is never a single cause for the mental state of a person. Thus overwork, so frequently blamed for nervous breakdown, is never a sufficient explanation for P. or psychoneurosis (q.v.). There are three groups of factors, constitutional, psychological, and physical, which have to be considered in every case. In certain types of psychotic and psychoneurotic reaction, especially the manic-depressive psychoses and schizophrenias, the constitutional (i.e. hereditary) factors are particularly important, but it may require the operation of psychological factors

(e.g. emotional upset) or physical factors (e.g. organic illness of any kind) before a predisposed person becomes manifestly psychotic or psychoneurotic. In other cases (e.g. delirium in acute infections) the physical factor is clearly the major one. The main types of psychotic reaction are described under insanity (q.v.).

Treatment of psychoses is usually carried out in hospital, but by no means all psychotic persons are in hospital, many being able to carry on a fairly normal life despite some psychotic symptoms. Treatment includes care and control and general medical attention. Suitable occupations are provided. Close supervision may be needed to prevent suicide. Of more specific treatment mention must be made of certain fairly recent advances which have revolutionised psychiatric practice: (1) the treatment of general paralysis of the insane, a dementing P. due to syphilitic infection of the nervous system, by means of infection with malaria, or artificially produced hyperpyrexia, and penicillin; (2) the treatment of schizophrenia by insulin injections almost daily, over a period of weeks or months, to produce hypoglycaemic coma; (3) the treatment of depressive states by electrically induced convulsions; (4) the treatment of certain severe and uncontrollable psychotics by pre-frontal leucotomy (q.v.), an operation on the brain; this operation is also of value in some severe psychoneurotic illnesses; (5) the use of drugs to produce prolonged sleep in the treatment of tension states and mania. The outlook in some of the illnesses so treated has completely altered, many patients recovering or improving for whom there would otherwise be little hope. See also under PSYCHIATRY; PSYCHOLOGY; PSYCHOPATHOLOGY. See D. K. Henderson and R. D. Gillespie, *A Textbook of Psychiatry* (5th ed.), 1944.

Psychotherapy, see under PSYCHIATRY. Psychrometer, alternative name for wet- and dry-bulb hygrometer (q.v.).

Ptah, god of anct. Egypt. At a very early period the prin. gods of Egypt were grouped into the Triads, consisting of husband, wife, and son. P., Sekhet, and I-em-hetep form the great triad of Memphis. P. was the self-created architect of the universe, and with assistance he carried out the work of creation under the command of Thoth. The Gks. identified him with Hephaestus, the constructor and builder of things. He is usually symbolised in the mummy-shape of Osiris.

Piarmigan (*Lagopus mutus*), smallest Brit. grouse, frequenting the highest mts. in its more S. range, and extending throughout the Arctic and sub-Arctic regions of the N. hemisphere. It formerly occurred in Cumberland and Wales, but in Britain is now confined to N. Scotland. It is an excellent instance of protective colouring, assimilating itself perfectly to its surroundings, the plumage becoming as it changes white, grey, red, or brown, except for the wings, underparts, and legs, which are always white. It hatches its young in June in a mere depression among moss and stones. The

males are monogamous. Poulterers import P. from Norway, where they are snared.

Pteris, see BOGHAN KEUL.

Pteridophyta (Gk. πτερον, a fern (from πτερον, a wing, with reference to the feathery fronds), and φυτόν, a plant), the great group, or phylum, of the plant kingdom which comprises the ferns and their allies: horse tails, club-mosses, and many extinct plants, some of which were of large size and became transformed into coal deposits. The remaining phyla of plants are the Spermatophyta (seed plants, including those with flowers), Bryophyta (mosses and liverworts), and Thallophyta (algae, fungi, and lichens). The P. are also known as vascular cryptogams, since there is no obvious sexual process in their mode of reproduction: microscopic spores are formed and these develop into small independent bodies called prothalli, which reproduce sexually and give rise to a new generation of adult plants, so that there is an alteration of generations. See articles on the individual plants, etc.

Pteris, see BRACKEN.

Pterodactyl, Pterosauria, or Wing-fingered Lizard, name for members of an extinct family of reptiles found in the Jurassic system of the Mesozoic era. They varied greatly in size; while some species had a wing expanse of about 25 ft., twice that of the albatross, others were hardly bigger than sparrows. They are among the most remarkable and strange forms of life revealed by palaeontology.



FOSSIL OF PTERODACTYLUS (RASBIDOROSINUS (JURA)

Though essentially reptiles, they resembled birds in many respects. The breastbone has a keel to which the flying muscles were attached. The bones are often hollow and the skull forecasts avian characteristics. The resemblance between Ps. and birds is, however, the result of the similar mode of life, and does not imply any direct evolutionary relationship. The jaws of Ps. are long, powerful, and armed with teeth. The forelimbs possess four digits, three with claws and the fourth or outer one greatly prolonged to support a membranous wing.

Pteropods, or Sea Butterflies, group of Opisthobranch molluscs, comprising about a hundred species, which are organised for

swimming freely in the ocean, having a pair of fins developed from the sides of the mouth and neck, enabling the animal to progress by flapping. There are two families in the group. The Thecosomata are provided in the adult form with small glassy shells; though the young of all P. are protected by a shell, the species belonging to the second order, Gymnosomata, are naked when adult. In some parts of the ocean they exist in immense numbers, discolouring the water over vast tracts, and in high lats. they, especially *Clio borealis*, constitute the prin. food of the baleen or whalebone whales, which strain them from the water with the whalebone sieve. The iridescent fretted shell of *Clio cuspidata* is the best-known shell of the Thecosomata. The shells of some form a considerable sediment at great depth.

Pterosauria, see PTÉRODACTYL.

Ptolemaic System, system of the universe, as held by the Gk. philosophers and physicists, and expounded by Ptolemy (q.v.). The earth, a sphere, is the centre of the universe and the heavenly bodies move round it in circles. Earth, the stable element, occupies the lowest place, then water, the fluid, and the ether beyond. The 'crystalline' sphere of the heavens in which the stars were fixed revolved round the earth, and, to account for differing motion of other bodies, other spheres, contained within the great one, carried the moon, nearest, then Mercury, Venus, the sun, Mars, Jupiter, and Saturn in that order. There were thus eight spheres. The system was full of difficulties, and later astronomers added a ninth sphere to account for the precession of the equinoxes, a tenth to cause day and night; this was the 'primum mobile.' The sun sphere had to be placed eccentrically, a first movement towards discovery of the elliptical orbit, to account for variations in its motion. To account for the irregularities in the motions of the planets, the final form of the Ptolemaic scheme attributed two motions to each of the bodies. The first was a motion in a circle (the *epicycle*) round a centre which in turn moved in a larger circle, known as the *deferent*, the centre of which was the earth. The motion of the sun did not conform to this scheme, it moved round the earth, the circumference of the circle lying between the deferents of Venus and Mars. The moon, known to be the nearest body to the earth, also moved in a simple circle round the earth.

Ptolemais, see ACRE, ST. JEAN D'.

Ptolemy, or Claudius Ptolemaeus, astronomer and geographer, was a native of Egypt, and lived at Alexandria during the first half of the second century A.D. His chief works were the *Almagest* (*Μεγάλη Συναγωγή τῶν Ἀστρονομικῶν*), the *Γεωγραφικὴ Συναγωγή*, a lesser work, both astronomical, and the *Geographia* in eight books. As an astronomer his work is not so independent; he summed up the knowledge of the Gks. and followed Hipparchus almost entirely. His works are, however, our only source of knowledge of ant. astronomy, and were the only authoritative work till the time of Copernicus. In geography he followed

Marinus of Tyre, but much was the outcome of his own genius. All the eight books on geography, except the first, a portion of the seventh, and the eighth, form a catalogue of places, with lat. and long., and brief descriptions; the other portions deal with the theory of lat. and long., the shape and size of the earth, extent of surface, and modes of projecting maps on a plane surface. He constructed twenty-six maps and a general one of the earth. His works were the authority on geography till the fifteenth century. Among other works are: *The Centiloquium*, a 'canon of kings' (chronological list of Assyrian, Persian, Gk., and Rom. kings), *De Apparentiis et significationibus Inerantium*, *De Aëtemate*, and *Planisphaerium*. He wrote on the musical scale and possibly on optics. He discoveredvection (q.v.), and extended the use of trigonometry.

All Gk. works on P. have been superseded by Heiberg's ed. of the astronomical work of P. (1899-1907), to which has been added a Ger. trans. of the *Syntaxis* by Manitius (1912-13). The eds. of Erasmus and Elzevir contain numerous errors. See (Claudii) Ptolemaei Geographia (ed. C. Muller, and C. T. Fischer in *Bibliotheca scriptorum graecorum*, 1883 and 1901); T. G. Italy, *Geography of Ptolemy*, 1893; L. O. T. Tudeer, *Studies in the Geography of Ptolemy*, 1927; J. W. Kubitschek, *Studien zur Geographie des Ptolemaeus*, 1931; and P. Schnabel, *Text und Karten des Ptolemaeus*, 1938.

Ptolemy, or Ptolemaeus, dynasty of Macedonian kings, who ruled in Egypt from 323 to 30 B.C. The founder, *Ptolemy I.* (323-283 B.C.), was the son of Lagus, one of Alexander the Great's most trusted generals. Egypt was his share of Alexander's conquests. He assumed the title of king in 303 B.C. P. or Soter I. commenced the great library and museum at Alexandria where, under his patronage, Euclid taught mathematics; it was through him that the worship of Serapis was introduced. His name Soter (Saviour) was earned by the assistance he gave to the Rhodians when they were besieged by Demetrius (304).

Ptolemy II., called Philadelphus (283-246), was chiefly famous for his splendid court and general delight in luxury, and his encouragement of commerce. His first wife was Arsinoë I., daughter of Lysimachus. After repudiating her he married his sister, the beautiful Arsinoë II., the widow of Lysimachus, and deified her at her death. P. built the great lighthouse at Alexandria known as the Pharos. He delighted in the library and encouraged all intellectual pursuits. Manetho, the priest-historian, flourished during his reign.

Ptolemy III. (Euergetes I.) (246-221), son of P. II. and Arsinoë I. He married Berenice, the daughter of Magas. He invaded Syria, reduced Mesopotamia and Babylonian and Susiana, while his fleet were triumphant as far as Thrace. He left many monuments in Egypt, among them the unfinished temple of Edgu.

Ptolemy IV., called Philopator (221-204), son of P. III. He married his sister, Arsinoë III. He was a debauchee who started the gradual decline of his kingdom.

Ptolemy V., called Epiphanes (204-181), son of P. IV. and Arsinoë III., was only five years old when he came to the throne. He married Cleopatra, daughter of Antiochus. His reign was chiefly remarkable for the cruelty displayed in the suppression of native rebellions. The Rosetta stone was inscribed during his reign.

Ptolemy I.I. (Philometor) (181-145) and **Ptolemy VII.**, nicknamed Physkon, ruled jointly, sons of P. V. and Cleopatra. Philometor married his sister Cleopatra, and their infant son succeeded as P. Philopator. His uncle P. Physkon murdered him and seized the throne, marrying the widow (his sister) of his brother P. Philometor.

Ptolemy X. was murdered by the people, and an illegitimate son of Soter II. succeeded, known as Auletes the flute-player (80-51). Rome supported him and when the people drove him out restored him. His son P. Dionysus succeeded (51-47); the boy was only ten when he came to the throne, and he ruled jointly with his beautiful sister Cleopatra. He perished in the war against Rome, and his younger brother P. Philopator was placed on the throne. He died by poison; tradition asserts that Cleopatra was responsible for his death. Caesarion, Cleopatra's son, by Julius Cæsar, was officially known as P. XIV. He was murdered by Octavianus, 30 B.C.

See also under EGYPT. See J. Mahaffy, *The Empire of the Ptolemies*, 1895.

Ptomaines, poisonous bodies formed in putrefying animal matter. They are not a chemically distinct group, for some (like putrescine) are amines, others (creatinin) are amino-acids, while neurine is tetramethylvinyl-ammonium hydroxide. Not all the P. are poisonous, some being perfectly harmless. A supposed common property, which related them to the alkaloids, was their alkalinity. Creatinin, however, when pure, does not affect litmus nor does it combine with acids like a base. Putrescine, $(CH_2)_4(NH_2)_2$, and cadaverine, $(CH_2)_5(NH_2)_2$, are two well-known P. contained in putrefying albumen.

Ptosis, drooping of the upper eyelid which may affect either or both eyes. The condition is caused by paralysis of that branch of the third motor oculi nerve which controls the raising of the eyelids. In some cases this may be a congenital condition. In acquired cases it may be associated with general disease or caused by local lesions.

Pyralin, amylolytic ferment in saliva. Its function is to convert insoluble starch to sugar.

Puberty, occurring between childhood and adolescence, is that period when, in both sexes, the generative organs become capable of exercising the function of reproduction. The changes that begin then and the full development of the body and mind take many years. In girls the form

begins to develop and the menses appear, while in boys the voice 'breaks' and semen may be discharged. The change generally occurs more rapidly among girls than boys, and it is also noticeable that at this time their rate of growth is also quicker than that of boys. The age at which P. begins varies, and is determined, among other things, by climatic conditions, but in temperate climates, generally, it may be said to take place among girls at from twelve to fourteen years, and among boys from fourteen to sixteen. At this time care should be exercised, particularly with girls, because of the stress which the nervous system is subject to, and overstrain, whether physical or mental, should be guarded against.

Public Address Broadcasting, see under LOUDSPEAKER.

Publicani, or **Farmers-General**, business men of anc. Rome, who bid every *lustrum* (five years) at a public auction, held by the newly appointed censor in Rome, for the right either of collecting the taxes due to the state treasury from the lands of Italy and the provs., or of contracting for the execution of public works. Often the P. formed joint-stock companies (*societates publicanorum*). Drawn from the equestrian ranks, they rapidly acquired great political influence as the capitalistic class, their enormous wealth being amassed often by gross extortion and embezzlement.

Public Assistance, term used since 1928 in Great Britain for poor relief. See POOR LAW.

Public Company, see under COMPANY AND COMPANY LAW.

Public Debt. Wherever a matured state has existed, some system of taxing a portion of the capital of the country in the form of a loan to meet the purposes of government has co-existed. The anc. world of undeveloped political societies knew nothing of P. D. for the simple reason that mankind had not as then attained to the idea of investment generally, and, while commerce was in its infancy, gavs., like individuals, relied upon hoarded treasure to meet temporary exigencies. In England, prior to the revolution of 1688, there was no national debt, or, in any case, there exist practically no items in the P. D. of Great Britain referable to that period. This seeming anomaly is due to the simple fact that when the gov. of the day obtained grants from Parliament those grants were always followed by a formal release of the monarch from his obligations. The kings of the fourteenth and fifteenth centuries raised loans under the name of benevolences, a practice constantly resorted to by later monarchs. Charles I. strained the archaic and unpopular laws to raise money, while most of the Tudor and Stuart monarchs received subsidies from the Commons. But the indebtedness of the state was never acknowledged, and it would never have occurred to any one that money ostensibly or in fact required for the purpose of carrying on a war or any other purpose of government was repayable at interest.

Nearly the whole of the Brit. P. D. prior to 1870 (in March 1866 it amounted to £805,000,000) had been contracted for 'unproductive' purposes and the borrowing by present-day govts. for permanent public works (productive loans) is essentially a feature of the more liberal conceptions of the modern state.

The method of raising forced loans under the privy seal ceased at the beginning of the seventeenth century. After the Restoration the customary mode of raising loans was by the issue of tallies in anticipation of revenue, though even when William III. became king the actual recognised debt was no more than £84,888 Gs. 9d., borrowed on tallies in anticipation of duties on Fr. linens (Palgrave's *Dictionary of Political Economy*). The beginning of the national debt may be said to date from the reign of Charles II., when the London goldsmiths began the practice of advancing money to the Exchequer on the security of an assignment of some branch of the public revenue. But it was not till 1694 when the Bank of England was incorporated that it really became a permanent institution, as Charles II., with the assistance of the Cabal administration, practically repudiated the state's indebtedness by ceasing to pay interest. On the grant of the bank charter, in consideration of a loan of over a million, Parliament reserved to itself the right to redeem the national debt at any time after 1705, with which redemption the charter of incorporation was to expire. It is a commonplace of hist. and economics that, far from redeeming, succeeding govts. merely increased their indebtedness. During Queen Anne's reign the P. D.

amounted to £54,000,000; in 1763, after the Seven Years War, it reached £146,000,000; the Amer. War of Independence increased it by £121,000,000, while at the close of the Napoleonic wars no less than £601,000,000 was added, when it reached £900,000,000 (Jan. 1816), the ann. expenditure for interest and management being over thirty millions.

The ordinary sources of revenue have from time to time continued to be supplemented by loans, and a more practical inquiry is that which is directed to devising some scheme for its progressive reduction. Sir Robert Walpole, alarmed by the rapid increase in the P. D., instituted a sinking fund (*q.v.*) by the instrumentality of which a reduction in capital amount to the extent of £7,000,000 was effected before the beginning of the Seven Years War in 1756. Pitt created a permanent sinking fund in 1786; another was set up in 1875, and yet another by Baldwin in 1923.

The disadvantages attendant on the existence of a P. D. are in the popular mind more than outweighed by the public guarantee such a debt affords of a convenient form of investment, although at a low rate of interest, besides which the P. D. has been, perhaps, the prin. means of establishing the general advantages of a banking system.

The P. D. of Great Britain is classified into: (1) the *Permanent or Funded Debt*, which the gov. is under no obligation to redeem at any stated time; (2) the *Unfunded Debt*, made up of loans repayable at certain dates; and (3) *Terminable Annuities*, by means of which the capital sum is, at the expiration of the annuity, written off the P. D. The funded debt includes

The following table shows the amount of the national debt of Great Britain at the dates specified (including the Irish debt):

Date	Debt £ million	Annual charge, including terminable annuities £ million
1727 (accession of George II.)	52	2.4
1784 (end of Amer. War of Independence)	243	9.5
	<i>Gross debt, including terminable annuities</i>	<i>Annual charge, including interest, management, and new sinking fund</i>
	£ million	£ million
1815 (end of Napoleonic wars)	861	32.6
1803 (end of S. African war)	798	27.0
1914 (beginning of the First World War)	706	24.5
1923	6,657	321.0
1938	7,111	226.8
1941	10,478	230.0
1942	13,049	257.2
1943	15,670	315.9
1944	18,416	414.9
1945	21,237	465.0
1946	23,373	465.0
1947	24,967	515.9
1948	25,722	525.0

The composition of the national debt for 1938 and 1948 was as follows:

	1938 £ million	1948 £ million
Total national debt*	7,111.7	25,722.4
Less Bonds tendered for death duties and held by National Debt Commissioners (Victory Bonds and 4 per cent Funding Loan)	118.0	101.6
Net total national debt*	6,993.7	25,620.8
Total funded debt	3,364.8	3,902.0
2½ per cent Consols	276.1	276.0
4 per cent Consols	400.7	398.4
2½ per cent Annuities	21.1	21.1
2½ per cent Annuities	2.4	2.4
3½ per cent Conversion Loan	739.1	739.3
3½ per cent War Loan	1,911.4	1,910.9
3 per cent Treasury Stock	—	58.2
2½ per cent Treasury Stock, 1975 or after	—	—
Debts to the Bank of England and Bank of Ireland	13.6	13.6
Terminable Annuities	12.5	13.0
Total unfunded debt†	3,734.3	21,807.4
Internal: Total	3,734.3	20,252.6
Treasury Bills	828.7	4,910.2
Treasury deposits by banks	—	1,291.0
Ways and means advances	13.1	340.8
2½ per cent Funding Loan, 1956-61	200.2	200.2
2½ per cent Funding Loan, 1952-57	100.6	100.6
3 per cent Funding Loan, 1959-69	145.8	348.6
4 per cent Funding Loan, 1960-90	350.2	303.7
2 per cent Conversion Loan, 1943-45	—	—
2½ per cent Conversion Loan, 1944-49	206.5	—
3 per cent Conversion Loan, 1948-53	301.8	1.4
4½ per cent Conversion Loan, 1940-41	363.4	—
6 per cent Conversion Loan, 1944-61	322.8	—
2½ per cent National Defence Bonds, 1944-48	100.2	—
3 per cent National Defence Loan, 1954-53	—	320.8
3 per cent War Loan, 1955-59	—	302.5
2½ per cent National War Bonds, 1945-47	—	—
2½ per cent National War Bonds, 1946-48	—	—
2½ per cent National War Bonds, 1949-51	—	714.2
2½ per cent National War Bonds, 1951-53	—	522.3
2½ per cent National War Bonds, 1952-54	—	809.7
2½ per cent National War Bonds, 1951-56	—	426.1
3 per cent Savings Bonds, 1955-59	—	712.7
3 per cent Savings Bonds, 1960-70	—	1,009.0
3 per cent Savings Bonds, 1965-70	—	1,057.4
2½ per cent Savings Bonds, 1961-67	—	752.5
1½ per cent Exchequer Bonds, 1960	—	786.6
2½ per cent Treasury Stock, 1986-2016	—	78.5
4 per cent Victory Bonds	313.4	269.7
1 per cent Treasury Bonds, 1939-41	100.0	—
3 per cent Defence Bonds (first issue)	—	93.9
3 per cent Defence Bonds (second issue)	—	131.1
3 per cent Defence Bonds (third issue)	—	279.5
3 per cent Defence Bonds (fourth issue)	—	287.2
2½ per cent Defence Bonds	—	173.6
2½ per cent Defence Bonds (conversion issue)	—	68.0
National Savings Certificates	385.0	1,741.5
National Savings Bonds	3.7	—
3 per cent Terminable Annuities	—	1,067.4
2½ per cent Terminable Annuities	—	239.2
Tax Reserve Certificates	—	426.4
Other debt under the National Loans Act, 1939	—	480.3

* Excluding external debt arising out of the First World War.

† Including bonds tendered for death duties and held by the National Debt Commissioners.

March 31, 1948
£ thousand

External Debt:

United States—Government Loan	1,089,646
Loan from Reconstruction Finance Corporation	42,198
Canadian Government Loans	324,614
Government of Union of South Africa	79,997
Other debt (payable in external currency)	18,379
Total external debt	1,554,834

debts on account of the Bank of England stock, and that of the defunct E. India and South Sea Companies. In 1817 it was about £800,000,000; in 1894 it and the terminable annuities had been reduced to £635,000,000, partly from Goschen's sweeping reduction of the interest to 2½ per cent (since further reduced to 2½). The total reduction in the P. D. from 1837 to the beginning of the Boer War of 1899 was £153,000,000; but the expenses of that war and operations in China added an equal sum to the debt, and the gross amount in 1909 was £754,000,000. In 1917 the funded debt was over £3,900,000,000, about half being 3½ per cent war loan and the other largest items 3½ per cent conversion loan, consols, and 2½ per cent t. t. sury stock. The unfunded debt was over £21,000,000,000, of which the largest item was the floating debt (nearly £700,000,000, some £500,000,000 treasury bills, and £200,000,000 treasury deposit and ways and means advances). Other large items all over £100,000,000, were national savings certificates, 3 per cent savings bonds (1965–75), and 3 per cent savings bonds (1960–70).

The First World War, with its peculiarly difficult financial problems, caused the emergence of special measures with loans for war expenditure which small investors could take up and resulted in a considerable inflation of the national debt of all the belligerents. The need for money in Great Britain saw war loans held, not only on the books of the Bank of England, but also on the post office

register. Moreover war savings certificates were introduced becoming national savings certificates at a later date.

The national debt is administered by National Debt Commissioners, by whose agency measures for reduction, etc., are made. They do not, however, manage the sinking fund, or the Brit. debt to the U.S.A., this being an account known as the exchange account of the Treasury, which was set up during the First World War. For fuller details of the debt to America see DEBT and DEBT CONVERSION.

The growth and hist. generally of the national debt from 1694 to 1786 will be found in the Command Paper No. 9010, 1898.

Local Debt (see also LOCAL TAXATION RETURNS; LOCAL TAXATION GRANTS).—To ascertain the full indebtedness of the community to its members the aggregate debt of the various local spending authorities of Great Britain should be taken into account. The increase in this item of the public expenditure in recent years has been rapid (see also under MUNICIPAL TRADE), by reason principally of the constant augmentation of power and duties cast upon the shoulders of local authorities, and the wide sphere of municipal trading activity. The local debt of Great Britain and Ireland stood at £227,405,436 in 1890; it rose to £623,879,000 in 1909–10, and, from bearing a proportion of something like 30 per cent to the national debt (strictly so called) in 1890, it was in 1911 nearly equal to it. It must be borne in mind

REVENUE AND EXPENDITURE OF LOCAL AUTHORITIES IN ENGLAND AND WALES

1946–47
£ thousand

Revenue:**(a) Income from.**

Rates	243,247
Government grants	252,113
Trading services, housing rents, and miscellaneous	376,984
	872,344

(b) Capital receipts:

Loans	149,881
Government grants and repayment of advances	7,906
Sales and other receipts	5,094
	162,881
Total revenue	1,035,225

Expenditure:

Education, public health services, housing and town-planning, poor relief, highways, trading services, and other works and purposes	873,562
Loan charges	162,416
Total expenditure	1,035,978

REVENUE AND EXPENDITURE OF LOCAL AUTHORITIES IN SCOTLAND

1944-45
£ thousand

Revenue:

(a) Income from:

Rates	25,167
Government grants	25,394
Public utilities and other services	36,986
	88,047

(b) Capital receipts:

Loans	3,026
Sales of property	340
	3,372

Total revenue 91,419

Expenditure:

Education, hospitals, housing, gas works, and other works and purposes	88,697
Loan charges	3,698
Total expenditure	92,395

OUTSTANDING LOAN DEBT on March 31, 1946

£ thousand

Gross outstanding loan debt:

Housing	600,000
Trading undertakings	467,812
Other purposes	358,124
	1,426,096

Amount standing to credit of sinking funds 58,845

Net outstanding debt 1,367,251

that local debt is represented by considerable capital assets in the forms of land, houses, schools, hospitals, transport, water, gas, and other municipal undertakings. Details of these municipal enterprises will be found under MUNICIPAL TRADE.

United States of America.—The P. D. of the U.S.A. in 1791 was \$75,463,478; it had fallen nearly 50 per cent by 1812, after which it rose to \$127,331,933. During the following years it began gradually to decrease until 1836. After the civil war it reached its highest point in 1866, when it amounted to \$755,763,029. It subsequently fell until the Sp. Amer. war, when it rose again.

U.S.A. PUBLIC DEBT

	\$ million
1914	1,188
1919	25,482
1925	20,516
1929	16,931
1930 (lowest post-war)	16,185
1935 (after the New Deal)	32,524
1945	259,115
1946	269,898
1947	258,376

(The U.S.A. has no foreign debt; the figures show the total internal.)

United States Local Debt.—Beside the gross national debt of the Federal Gov., swollen as it is with the costs of war and totalling nearly \$270,000,000,000 in 1946, the aggregate debt of the separate states, mostly deficit and public works borrowings, looks small and is indeed greatly

exceeded by the aggregate municipal debt. Figures for 1946 (in \$ million) are state, 2358; co., 1437; municipal, 8197; school, etc., 3930; total, 15,922. Michigan, Nevada, and Wisconsin have no debt; Florida has no bonded debt; Columbia has no bonded debt not covered by slinking fund; and Alaska has no funded debt. Naturally the E. states, being more completely developed, have larger commitments than the more juvenile states towards the W. The total local debt of New York State in 1930 was \$250,249,447, while the city of New York accounts in 1946 show a total gross funded debt of \$2,895,125,000. The local debt of the other states is shown as follows:

	\$
Louisiana	155,829,000
Arkansas	114,421,000
Pennsylvania	113,388,000
California	121,737,000
Illinois	109,296,000
Minnesota	82,176,000
Tennessee (total direct and assumed debt)	79,016,000
Missouri	67,499,000
West Virginia	65,339,000
New Jersey	62,816,000
Massachusetts	57,261,000
South Carolina	53,114,000
Alabama	51,789,000
Mississippi	48,889,000
North Carolina	30,143,000
Connecticut	22,835,000
New Mexico	22,240,000
Rhode Island	20,517,000
North Dakota	18,949,000
Maryland	18,713,000
Colorado	18,294,000

South Dakota	18,272,000
Maine	10,414,000
Kansas	9,250,000
Washington	6,884,000
Virginia	6,378,000
Ohio	6,317,000
Arizona	5,788,000
Kentucky	5,464,000
Indiana	4,427,000
Idaho	4,418,000
Texas	4,102,000
Georgia	3,992,000
Vermont	2,682,000
Oklahoma	2,597,000
Oregon	2,239,000
Wyoming	2,020,000
New Hampshire	1,596,000
Montana	1,499,000
Nebraska	970,000
Utah	509,000
Idaho	340,000

The following tables show the P. D. of various commonwealth and foreign countries for selected years, the data being obtained from the United Nations Statistical office *Monthly Bulletin of Statistics* (Oct. 1948). By subtracting 'domestic' from 'total' the foreign debt can be calculated.

See R. Hamilton, *An Inquiry Concerning the Rise and Progress, and Redemption and Present State and the Management of the National Debt of Great Britain*, 1813; Lord Grenville, *Essay on the Supposed Advantages of a Sinking Fund*, 1828; J. S. Nicholson, *War Finance*, 1917; H. E. Fisk, *Our Public Debt*, 1919; *English Public Finance*, 1920, and *The Inter-Ally Debts*, 1924; P. Jensen, *Problems of Public Finance*, 1924; G. F. Shirras, *Science of Public Finance*, 1924, and *Federal Finance in Peace and War*, 1944; A. C. Pigou, *A Study in Public Finance*,

COMMONWEALTH COUNTRIES

AUSTRALIA			CANADA		INDIA		S. AFRICA		NEW ZEALAND	
Million £ (A)			Million dollars		Million rupees		Million £ (SA)		Million £	
Total	Domestic		Total	Domestic	Total	Domestic	Total	Domestic	Total	Domestic
1914	330	102	542	231	5,513	1,797	126	15	99	16
1919	694	317	2,675	1,554	6,625	5,587	166	41	176	76
1929	1,093	521	2,647	2,076	10,745	6,027	244	93	264	110
1939	1,295	704	3,708	2,832	12,064	7,375	279	174	303	146
1946	2,794	2,266	17,790	17,586	22,563	21,926	583	569	624	472

FOREIGN COUNTRIES

ARGENTINE			BELGIUM		CZECHO-SLOVAKIA		FRANCE	
Million pesos			Million francs		Million korunas		Million francs	
Total	Domestic		Total	Domestic	Total	Domestic	Total	Domestic
1914	1,495	644	4,984	4,688	—	—	39,023	39,023
1919	2,020	1,278	21,991	18,767	9,246	9,246	240,242	177,872
1929	3,036	1,966	52,216	24,637	32,670	27,363	480,173	279,873
1939	4,896	3,087	59,608	40,608	47,259	38,352	482,967	469,600
1946	11,506	11,506	273,258	242,391	104,758	88,825	2,195,643	1,974,977

GERMANY			ITALY		JAPAN		SWEDEN		SWITZERLAND	
Million Reichsmark			Million Lire		Million yen		Million kronor		Million francs	
Total	Domestic		Total	Domestic	Total	Domestic	Total	Domestic	Total	Domestic
1914	5,158	5,158	—	15,766	2,686	1,055	744	131	332	332
1919	156,452	156,452	—	60,213	3,255	1,741	1,567	1,040	1,979	1,785
1929	8,972	8,071	—	87,124	6,447	4,395	1,799	1,548	2,271	1,995
1939	30,847	29,558	—	145,795	17,921	16,557	2,664	2,531	3,101	3,101
1946	—	—	—	1,066,637	201,990	143,082	11,384	11,335	11,476	11,476

1928; E. L. Hargreaves, *The National Debt*, 1930; W. Withers, *The Retirement of National Debts*, 1932; and J. M. Keynes, *How to Pay for the War*, 1940.

Public Health. The preservation and improvement of P. H. through the coercive action of local governing bodies is a development of the later part of the nineteenth century. Prior to that period it was considered no part of the duty of the state to control the physical environment of the individual. In 1845 a royal commission appointed to inquire into the causes of disease among the inhab. of tns. reported to Parliament that the dists. inhabited by the labouring classes, and often by tradesmen in large tns. and in many small tns., were in such a noxious state from want of drainage, cleanliness, proper ventilation, and adequate water supply, and from the prevalent overcrowding, that typhus, fever, cholera, consumption, scrofulous, and other chronic complaints existed to an appalling extent. Modern P. H. methods are founded upon the studies of Sir E. Chadwick, Sir J. Simon (1816-1904), Dr. S. Farr (medical jurist), and others regarding the effect of environment on health, and upon the researches of Pasteur (q.v.) and Koch (q.v.) in the science of bacteriology.

The first Public Health Act was passed in 1875, and this notable piece of legislation, mainly concerned with environmental hygiene, remained in force, though amended in detail, until the passing of the Public Health Act of 1936. Among the more important Acts and regulations affecting the P. H., which were passed subsequently to 1875, and on which various services were founded, were the Factory and Workshop Act, 1901, Midwives Act, 1902, Education (Administrative Provisions) Act, 1907, Housing and Town Planning Act, 1909, Public Health (Tuberculosis) Regulations, 1912, Public Health (Venereal Diseases) Regulations, 1916, Milk and Dairies (Consolidation) Act, 1915, Maternity and Child Welfare Act, 1914, Ministry of Health Act, 1919, Blind Persons Act, 1920, Housing Act, 1925, Local Government Act, 1929, Public Health Act, 1936, Housing Act, 1936, Factories Act, 1937, and Food and Drugs Act, 1938. Some of those Acts have been partly or wholly repealed, and they are mentioned because they initiated or extended important P. H. services. Thus the school medical service, for the medical examination and treatment of schoolchildren, was estab. by the above-mentioned Act of 1907. This Act is repealed and the relevant powers are now incorporated in the Education Act, 1921. Similarly with the other Acts mentioned, e.g. the Maternity and Child Welfare Act is repealed, but similar provisions are to be found in the Public Health Act, 1936. The Local Government Act, 1929, an Act of far-reaching importance, transferred the functions of the old boards of guardians to the councils of cos. and co. bors. (see LOCAL GOVERNMENT). The Public Health Act, 1936, Housing Act, 1936, and the Food and Drugs Act, 1938, consoli-

dated previous legislation and are now the prin. Acts under which the greater part of the duties of P. H. depts. of local authorities are carried out.

In detail public hygiene or health, as expressed in the Acts administered by the various local authorities, was concerned with sewerage and the disposal of waste matters of all kinds, drainage, and sanitary conveniences, the abatement of nuisances, the collection of refuse, and offensive trades; infectious diseases (including tuberculosis and venereal disease) and, generally, the prevention of infection from disease; midwives, maternity and child welfare; estab. of hospitals; unsound and adulterated food; burial and cremation; pollution of water; regulation of factories and workshops; housing and tn.-planning; estab. of mortuaries; lighting; ventilation; and regulation, generally, of dairies, cowsheds, and milkshops, water supply, public baths and washhouses, recreation grounds, and construction of buildings. It is unnecessary, however, in this article to consider either the machinery of local gov. or the general powers of local authorities; these aspects of the subject under consideration having been fully dealt with under LOCAL GOVERNMENT and MINISTRY OF HEALTH.

Sewerage.—A local authority (i.e. a dist. or tn. council) is bound to provide and maintain such sewers as may be necessary to drain their area, and may carry their sewers under any lands they choose, subject to compensation to the owner. All sewers are repairable at the public expense (except those constructed for private gain or to irrigate land), though under the Metropolis Management Acts sewers in new streets may be constructed by tn. councils wholly or partly at the expense of adjacent landowners. There has been much controversy over the distinction between a sewer and a drain, but, in simple language, a drain serves only one premise, whereas a sewer receives drainage from two or more premises.) The local authority is bound to dispose of ordinary sewage matter, together with liquids from factories, but no injurious matter like chemical refuse or steam may be drained or let off into a sewer. Where persons responsible for trade premises want to discharge waste matter from them they must first apply to the local authority for permission to do so. The question of the disposal of sewage is dealt with under Sect. 14 of the Public Health Act, 1936, and that of the drainage of trade premises under the Public Health (Drainage of Trade Premises) Act, 1937. Unpurified sewage may not be discharged into any stream or lake, and most of the larger rvs. are protected in this respect by local Acts. The disposal of sewage matter has always been an economic problem, by reason not only of the cost of disposal without creating a nuisance, but also of the non-existence of any effective method of saving money by the use of the sewage matter for manure or for any other useful purpose, the whole usually finding its way as deodorized sludge into the

Drainage and Sanitary Conveniences.—The duty of draining a house falls upon the owner or occupier. Usually, in large tns., houses are drained into the public sewers, but in the smaller tns. and in thinly peopled dists. it is common to drain into cesspools. New houses must be drained into a sewer if there be one within 100 ft. of the premises. In default of the owner or occupier, the local authority is bound to effect a proper drainage, and can recover the cost from the owner or occupier. The local authority is empowered to enforce the provision of a proper water-closet or earth-closet, in every dwelling-house, and to make by-laws for a compulsory water supply for flushing the first-mentioned kind of convenience. Tn., metropolitan bor., and urb. dist. councils alike have power to construct sanitary conveniences for public accommodation. *See also* SANITATION OF BUILDINGS; SEWAGE.

Abatement of Nuisances. (*See under* NUISANCE for the general legal conception of a public nuisance.)—The nuisances which may be dealt with by a local authority are in practice limited to those expressly mentioned in various statutes (mainly the Public Health Acts, 1875, 1936) as falling within their powers of abatement. A P. H. nuisance, unlike a common law nuisance, is dealt with before a court of summary jurisdiction at the instance of the local authority. The law relating to these nuisances is now contained in Sect. 92 of the Public Health Act, 1936, which describes them as 'statutory nuisances.' They comprise: any premises; animals; accumulations or deposits; dust or effluvia from any trade, business, factory, etc., prejudicial to health or a nuisance; also any factory, workshop, etc., not properly ventilated or not kept clean or free from noxious effluvia, or so overcrowded as to be prejudicial to the health of the employees; and any other matter declared by the Act to be a statutory nuisance. The procedure is that the sanitary branch of the local P. H. dept. serves on the responsible person an abatement notice, and if this is ignored the local authority goes to a justice of the peace, who issues a summons and the court may then make a nuisance order requiring compliance or, in default, levy a fine, or the local authority may also abate the nuisance and recover the cost.

Collection of Refuse.—The local authorities outside the London area may or may not undertake to collect house refuse. They usually do so, and free of charge; but if they undertake to collect trade refuse or garden rubbish they may make a charge. If they do not undertake the duty themselves, they may make by-laws imposing the duty on occupiers. In London, however, this duty falls upon the bor. councils, the by-laws relative to it being drafted by the London Co. Council (L.C.C.).

Offensive Trades.—Offensive trades, under Sect. 107 of the Public Health Act, 1936, are those of a blood boiler, bone boiler, fat extractor and melter, fell-

monger, glue-maker, gut scraper, rag and bone dealer, size maker, soap boiler, tallow melter, or tripe boiler, together with certain trades, businesses, or manufs. which were offensive trades under an older Act of 1907, and also any other trades, etc., which the local authority, by order confirmed by the Ministry of Health, declare to be an offensive trade in their dist. It is unlawful to establish an offensive trade without the consent of the local authority, who may give consent to the estab. of an offensive trade for a limited period. The authority may make by-laws to prevent or diminish any injurious effects arising from offensive trades in their area. *See under* OFFENSIVE TRADES.

Notification of Infectious Diseases, and Disinfection of Premises and Articles.—Under the Public Health (Infectious Diseases) Regulations, 1927, certain infectious diseases must be notified by the head of the family to which the patient belongs (or, in his default, by any one in charge of the patient) to the dist. medical officer of health. The specified diseases are smallpox, cholera, diphtheria, membranous croup, erysipelas, scarlatina, scarlet fever, typhus, typhoid, enteric, relapsing, continued, and puerperal fever, consumption, and any other infectious diseases which the local authority may, with the approval of the Ministry of Health, add permanently or temporarily to the list. This was repeated in the Public Health Act, 1936, regulations under which Act or under similar sections of superseded Acts add various other diseases, including plague, cerebro-spinal fever, acute poliomyelitis, encephalitis lethargica, all forms of tuberculosis, ophthalmic neonatorum, acute primary pneumonia, dysentery, and malaria. Medical practitioners called in to visit the patient must also send certificates to the medical officer of health, stating the name and address of the patient and the nature of his disease. Keepers of common lodging-houses are also required to notify both the medical officer and the poor-law relieving officer of cases of infectious disease occurring in their houses. Power is conferred on local authorities by the Public Health Act, 1936, to remove to hospital an inmate of a common lodging house who is suffering from a notifiable infectious disease, and also on a court of summary jurisdiction to order the closing of the common lodging house on account of the occurrence of such disease. By the Milk and Dairies Order, 1926, dairymen in dists. where the Act has been adopted are bound to notify cases of infectious diseases occurring among their employees, and may also be required to disclose the sources of their milk supply. Where patients cannot be effectually isolated in the premises where they may happen to be, the police may, on an order of a magistrate of the local council, and subject to the consent of the superintending body of the hospital, remove them to any suitable neighbouring hospital. Where the Infectious Diseases (Prevention) Act, 1890 (substantially re-enacted in Part V. of the Public Health

Act, 1936), has been adopted, the local authority may provide free temporary accommodation for the members of a family in which infectious disease has broken out while the council disinfect their dwelling. The local authority may provide nurses where the hospital has not sufficient accommodation for the patients. Under the Public Health Act, 1936, a fine of £5 may be inflicted upon a person who exposes himself in a public place or place of entertainment, when he knows he is suffering from a notifiable disease; or allows a patient under his charge to do so; or gives or sells or exposes infected clothing or bedding; engages in a trade or occupation involving risk of spread of infection; or allowing a child, in his care, to attend school when the child is suffering from such infection. (See also under LANDLORD and TENANT as to letting infected premises.) Under the Public Health Act, 1936 (re-enacting the Infectious Diseases Notification Act, 1925), a local authority may pay the expenses of disinfecting bedding, clothes, and other things, if the disinfection be carried out by them or under their directions, and they may direct articles which have been exposed to dangerous infection to be destroyed, subject to compensation.

Tuberculosis.—The administrative methods by which tuberculosis is controlled are separate and distinct from those in connection with other types of infectious diseases. Tuberculosis schemes in England and Wales are administered by co. and co. bor. councils and, in London, by the L.C.C. An organised service dealing with the disease was initiated under the Public Health (Tuberculosis) Regulations, 1911, which required notification of all cases of pulmonary tuberculosis. This requirement is extended to non-pulmonary cases in 1912. Powers and duties in relation to treatment were contained in the Public Health (Tuberculosis). This requirement was extended. The present law is to be found in the Public Health (Tuberculosis) Regulations, 1930, and the Public Health Act, 1936 (Sects. 171–75). The regulations relate to notification by medical practitioners and the Act to treatment. It is the duty of the council to make adequate arrangements for the treatment of persons in their area, at or in dispensaries, sanatoria, and other approved institutions. Without prejudice to other provisions in the Act, the local authority may make such arrangements as they think desirable for the treatment of tuberculosis, and the council of a co. or co. borough may make arrangements for the after-care of persons who have suffered from tuberculosis.

Maternity and Child Welfare.—The forerunner of the modern child welfare clinics was that which was opened in Paris in 1892 by Dr. Pierre Budin, in which year, too, Variot estab. milk stations (*gouttes de lait*) where clean milk was distributed to poor mothers. This movement spread to England in 1899 through the estab. of a milk station at St. Helens, Lancashire. The system of clinics

and milk depots, largely carried on by voluntary societies, was regularised and put under the general supervision of the Ministry of Health by the passing of the Maternity and Child Welfare Act, 1918, now repealed and included in the Public Health Act, 1936 (Sect. 204). Notification of births was not made compulsory until 1915, though Huddersfield Corporation in 1906 had secured parl. powers for compulsory notification of births in that borough. A Midwives Act of 1902 estab. a board whose duty it was to publish a roll of certified midwives and to regulate their training and examinations. The last amending Act, that of 1936, estab. in all areas of England and Wales a full-time service of midwives employed by local authorities or by voluntary organisations. In Scotland the Maternity Services (Scotland) Act, 1937, goes further than the Eng. Act by providing for the services of doctor as well as of a maternity nurse at each confinement. When the family are in comfortable circumstances the question of arrangements for antenatal supervision or for confinement hardly concerns the P. H. dept., but under the Public Health Act, 1936, the usual notification is sent by the doctor after the birth; and in practice no further action is taken by the P. H. dept. of a local authority. The legislation which laid the foundation of the modern system of child welfare was comprised in the Notification of Births Act, 1907, and the Notification of Births (Extension) Act, 1915. The Act of 1907 was adoptive only, but the later Act made notification compulsory in all areas. Both Acts were repealed by the Public Health Act, 1936, Sect. 203 of which make compulsory the notification to the Ministry of Health of births in all areas. The onus of notification is upon the father, if residing in the house at the time of the birth, or any person in attendance at the time or within six hours of the birth; but in practice notifications are almost invariably made by the doctor or midwife (notification should not be confused with registration (*q.v.*)). The infantile mortality rate has steadily declined for many years (74 per 1000 in 1929; 53 in 1938; 48 in 1944; and 43 in 1946) and this rate is a fairly reliable index of the environmental conditions into which children are born and in which they spend the first twelve months of their lives; the fall which has taken place is closely related to the improvements in the standard of life, in housing, dietary, and in education. Improvements in communal hygiene and the work of the child welfare clinics are also factors to be taken into consideration. The law on the protection of children was contained in the Children Act, 1908, and the Children and Young Persons Act, 1932; but the relevant sections have been incorporated in Sects. 206–20 of the Public Health Act, 1936, which also contains some additional provisions. Sect. 206 makes it necessary for any person who undertakes for pay the nursing and maintenance of a child under nine years of age, apart from its parents or

having none, to give notice to the welfare authority. The welfare authority must appoint child protection visitors whose duty it is to visit from time to time any foster children in their area and satisfy themselves as to the health and well-being of such children. The Ministry of Health, in conjunction with the Ministry of Education, institutes a system of inspection of school children for the purpose of checking malnutrition, and the maintenance of clinics where dental, eye, and other troubles may be treated.

Provision of Hospitals.—The public, as distinct from voluntary, hospitals were owned and managed by local authorities. The public hospitals sprang from the parochial system of the forty-third year of the reign of Queen Elizabeth and these parochial functions were later transferred to boards of guardians. Early in the nineteenth century all types of sickness, including cholera, typhus, and smallpox, were being treated in workhouse institutions. It was not until the passing of the Public Health Acts of 1866 and 1875, prompted by the cholera epidemics, that the local authorities set up by the Municipal Corporations Act, 1835, were empowered to build hospitals for infectious and other diseases. There are now over 600 infectious disease hospitals, half of which were erected for the treatment of smallpox. The Insurance Act, 1911, stimulated the growth of sanatoria for tuberculosis. Under the Local Government Act 1929, all the functions of the boards of guardians were transferred to co. boroughs and co. councils, including the treatment of the sick in hospital. The Metropolitan Asylums Board of London, which once administered the isolation and mental hospitals of London, was dissolved and the hospitals of that area transferred to the L.C.C. These transferred hospitals became vested in Public Assistance Committees, the intention of Parliament being that the hospitals so transferred should be operated, not under the Poor Law Acts, but under the Public Health Acts. By 1936 almost all the public hospitals in England and Wales had been so transferred—numbering 577, with about 130,000 beds; while the other hospitals in the ownership of local authorities, including isolation hospitals, maternity homes, and sanatoria, numbered in 1939 an additional 1200 with nearly 60,000 beds. Whilst some of the hospitals transferred were modern in character, others were buildings erected originally as workhouses and were in need of much adaptation in order to function as hospitals. The mental hospitals and institutions for the mentally defective were generally managed by co. and co. boroughs. There were before the Second World War about 1000 voluntary hospitals, containing 90,000 beds. The Health White Paper (1944) was proposed to create joint regional authorities for the administration of services, such as hospitals and specialist treatment, which could only be made fully effective if they could draw on the resources of areas larger than those of most

existing local authorities. In conformity with the institution, by the National Health Service Act, 1946, of a comprehensive national health service available to all, and for which the minister of health is responsible, provision was made for the minister of health to take over all voluntary and public hospitals, subject to the teaching hospitals being given special treatment. Supplementary services, such as midwifery, maternity and child welfare, are provided through the local authorities. Regional hospital boards to administer the hospital and specialist services were set up in about a score of regions, each large hospital or related group of hospitals having a management committee. Except in the case of voluntary teaching hospitals, endowments were to pass to a new fund, which the minister of health would administer, the capital value of the fund being apportioned among the regional boards and the income from each portion passing to the boards. See further under NATIONAL HEALTH SERVICE ACT, 1946; HOSPITALS.

Unsound and Adulterated Food.—Both the medical officer of health and the inspector of nuisances have power to seize any unsound article sold or exposed for sale and intended for the food of man, and to take it before a magistrate, who may condemn it and order its destruction, and fine or imprison the owner or person in whose possession it was found. Under various Acts local authorities have power to make by-laws for preventing the sale of unwholesome provisions in markets or fairs. There are also stringent statutory provisions against the sale of adulterated butter or milk; and samples of butter, margarine, and milk may be taken by the public analyst, or any one acting on his behalf, without warning of his intention to analyse. Vendors of horseflesh are bound to indicate the nature of their business by a conspicuous notice outside their premises. The legal standards of cow's milk are described in the Sale of Milk Regulations, 1939. Under Sect. 24 of the Food and Drugs Act, 1938, it is forbidden to add any water or colouring matter, or any dried, condensed, or separated milk to milk intended for sale; it is illegal to sell as milk a mixture of cream and separated milk. The Milk and Dairies Order of 1926 was passed with the object of improving the conditions under which milk is produced. It contains many provisions for securing cleanliness, including provisions for cattle inspection, cleanliness of dairies, and workers in them, and of conveyance and distribution. Pasteurisation is provided for in the Milk (Special Designations) Order, 1936 and 1938. This includes tuberculin-tested milk. Sect. 25 of the Food and Drugs Act, 1938, prohibits the sale of tuberculous milk. Cream which is artificial must be so labelled (Food and Drugs Act, 1938). The sale of dried milk is governed by regulations of 1923 and 1927, and similarly condensed milk. The Food and Drugs Act also contains provisions on the adulteration of butter and the moisture content of butter and margarine. The use

of chemical preservatives for food is strictly limited by the Public Health (Preservatives, etc.) Regulations, 1925 and 1927. Other regulations for the control of food deal with slaughtering, meat marking, and the handling and sale of meat.

Pollution of Water.—See *Sewerage* above and **WATER SUPPLY**.

Regulation of Factories and Workshops.—See **FACTORY LEGISLATION**.

Housing of the Working Classes and Repair of Houses.—This wide subject is dealt with under **HOUSING**. But it may be mentioned here that although the Public Health Act enables the P. H. dept. to require repairs to buildings other than houses, the extent of the repairs which can be enforced is much more limited than by using powers under the Housing Act. Repairs under the Public Health Act must come into the category of defects which are prejudicial to health or a nuisance (Sect. 92). Thus a dwelling-house or an office building with a leaky roof, defective downspouts, drains, or sanitary conveniences may come within the provisions of Sect. 92 of the Public Health Act, 1936, because such defects may be either nuisances or injurious or likely to cause injury to health. But worn floor-boarding, broken or missing rails to staircases, defective doors, broken plaster, are by no means either nuisances or injurious to health and can only be dealt with under the comprehensive powers afforded by the Housing Act. While, however, powers to enforce repairs, under the latter Act, can only be used once within a period of years, notices under the Public Health Act in respect of minor repairs can be, and are, served repeatedly as often as defects, properly coming within that Act, are discovered.

Water Supply.—It is the duty of the local authority to provide a general supply of water if danger to health arises from unwholesomeness or insufficiency of the existing supply. This is without prejudice to their powers to compel owners of houses to provide a supply of water thereto (Public Health Act, 1936, Sect. 3.) Par. councils may utilise wells, springs, or streams for water supplies. Local authorities may make by-laws for preventing contamination, waste, or misuse of waters of a public supply. They may also close or restrict the use of water from a polluted source (Sect. 140).

Public Baths and Washhouses.—Where a local authority have adopted the Baths and Washhouses Acts, 1846-95, since extended by the Public Health Act, 1925, they may purchase or lease existing baths in or near their dist., or erect baths and washhouses or provide open-air bathing places, together with all necessary furniture and appliances.

Recreation Grounds.—Most tn. and dist. councils have full power to provide pleasure and recreation grounds and to regulate the use of the same. In the administrative co. of London, where such grounds or 'lungs' are recognised to be vital to P. H., the L.C.C. and the various bor. councils have power, under the Open

Spaces Act, 1906, and the Metropolis Management Acts, to purchase or lease ground for this purpose.

Construction of Buildings.—Under Sect. 61 of the Public Health Act, 1936, power is given to local authorities to make by-laws in respect of the construction of buildings, and for their guidance in such matters the Ministry of Health have issued a series of model by-laws indicating a desirable standard. The main object of these by-laws is to ensure the construction of houses whose walls shall be of proper thickness, materials and construction adequate to resist fires (see also **FIRE WALL**), foundations and site consistent with the health of the inhab., and the sanitation, access at the rear, lighting and so forth, strictly conformable to all reasonable requirements. See also the article **HOUSING**.

Port Health Administration.—This is mainly a matter for the Board of Trade under the Merchant Shipping Acts but port health authorities are constituted by the Ministry of Health which exercise over shipping within their area functions similar to those of sanitary authorities on land. Port health authorities (previously known as Port Sanitary Authorities) are constituted under the Port Sanitary Regulations, with powers derived, now, from Sects. 2-10 of the Public Health Act, 1936. Thus the master of every ship coming from abroad must notify, by wireless, to the Port Health Authority the existence of any person suffering from some notifiable infectious disease. The authority can appoint medical officers (commonly referred to as boarding medical officers) to examine persons suffering from infectious diseases, and to require the master to take steps for the destruction of vermin. The duties of the authority also include the supervision of all imported foodstuffs intended for human consumption.

In the U.S.A. the various states have P. H. services similar to those of Great Britain adjusted to their individual needs. The International Health Div. of the Rockefeller Foundation has granted a generous donation for the purpose of educational tours for the teaching of hygiene. These tours cover such topics of P. H. as administration for P. H. officials, specialists in tuberculosis, infant hygiene, school hygiene, the health administration of ports, and demographic statistics, etc. The League of Nations estab. a special health committee and pub. monographs on the organisation and working conditions of P. H. services in different countries of the world, besides issuing the International Health Handbook. A constitution for a World Health Organisation (of which the League of Nations had made an important beginning) was agreed upon by the United Nations in Paris in June 1946 (see **HEALTH ORGANISATION, WORLD**). See also **HYGIENE; HOUSING**.

The bibliography on the subject is enormous, but for the most part each authoritative text-book covers the same ground. The bibliography at the end of

the article on LOCAL GOVERNMENT will apply to this article. See Stella Churchill, *Health Services and the Public*, 1928; G. B. Bannington, *English Public Health Administration*, 1929; G. Newman, *The Huddling of a Nation's Health*, 1939; W. M. Frazer and C. O. Stallybrass, *Textbook of Public Health* (10th ed.), 1940; and ann. reports of the Ministry of Health.

Public Holidays, see BANK HOLIDAYS.
Public Houses, see INNS and INN-KEEPERS and LICENCES AND LICENSING LAW.

Publicity, see ADVERTISEMENT and PUBLIC RELATIONS OFFICER.

Public Liability Insurance, see under INSURANCE.

Public Libraries Act, see under LIBRARIES.

Public Meeting. It is a somewhat unconstructive principle of Eng. law that any person may meet another person or an indefinite number of persons at any appointed place so long as they do not thereby break the law. This principle is a mere application of the constitutional liberty of the subject, and to understand the limitation of that principle it is only necessary to define an 'unlawful assembly' and to specify the various acts in places of public resort that are forbidden by statute or local by-laws. An unlawful assembly is generally defined as a 'meeting of great numbers of people under such circumstances of terror (by reason, for example, of their weapons or generally menacing attitude) as cannot but endanger the peace and raise fears in the minds of reasonable people of the neighbourhood. The knowledge by an agitator or other person convening a meeting that his appearance is likely to provoke a breach of peace according to the better opinion makes the meeting *ipso facto* unlawful. Among forbidden acts in public places by meetings are the blocking up of public thoroughfares or interfering with the general convenience of other people, or the annoying thereby of tenants of adjacent houses. The general principle is that a public thoroughfare is provided for no other purpose than to provide a means for the public of passage and repassage. A place of public resort like Trafalgar Square or Hyde Park is analogous thereto, and, strictly, persons have no right whatever to hold P. Ms. for the discussion of any question, whether social, religious, political, or otherwise. See also PUBLIC ORDER ACT (1936).

Public Opinion, resultant of individual opinion and wishes on questions of public life. The existence of an informed P. O. is an essential basis for a strong democratic system. The spread of education amongst the broad mass of the pop., and especially the inclusion of civics, i.e. a knowledge of the workings of national and local gov., is a necessary foundation, and book publishing free from the control of the gov. of the day has long been recognised as essential for the expression of P. O., and for the provision of facts upon which it can be based, to which has been added in more recent years the use of radio and film. The possibility that these and similar media

could be used to mould P. O. according to the wishes of the ruling party has been demonstrated with especial force by the totalitarian systems of the twentieth century, with the necessary corollary of a rigid censorship. P. O. has become a matter for attempted scientific investigation, usually by the technique of sampling (see GALLUP POLL), and the historical study of P. O. at various periods, and, for example, in connection with particular elections, has been undertaken.

Public Order Act (1936), passed at a time when various para-military organisations, in imitation of the Fascists and Nazis, adopted black, brown, green, or other distinctive shirts, marched in procession, and held political meetings which not infrequently led to disturbances of the peace. This development was in the nature of things far more marked on the Continent than in Britain, where, however, there were occasional clashes between the 'black shirts' of the Brit. Union of Fascists and the Communists. The Public Order Act prohibits both para-military organisations and the wearing of uniforms in connection with political objects. It also gives powers to the police for the preservation of public order on the occasion of processions. If the chief of police, having regard to the time or place at which, and the circumstances in which, any public procession is taking place or is intended to take place and to the route proposed, has reasonable ground for apprehending that the provocation may occasion serious public disorder, he may give directions imposing upon the organisers or participants such conditions as seem necessary for keeping public order, including conditions prescribing the route. No conditions, however, restricting the display of flags, banners, or emblems may be imposed by the Act except such as are reasonably necessary to prevent risk of a breach of the peace.

Public Policy, see CONTRACT.
Public Prosecutor. This officer's duty is to take criminal proceedings under the superintendence of the attorney-general, in cases of importance or great difficulty, or in cases where, from the unwillingness or failure of the person aggrieved to prosecute, it is desirable in the public interest that the offender should not escape justice. In cases of importance or difficulty the P. P. must give advice to clerks of justices and to chief officers of police and other persons concerned in the proceedings. He may also assist private prosecutors by authorising them to incur special costs to obtain scientific evidence or the help of counsel. The office, prior to 1908, was held by the solicitor for the time being to the Treasury, but is now a separate office. For U.S.A. see STATE ATTORNEY.

Public Record Office, archives of the central gov. of Britain, ant. and modern. Few records have survived from the period in which administration was carried on in the king's court without any great degree of specialisation of function. With the developing scope and activity of the royal gov. was introduced an increasing

specialisation of the work, as the surviving records show. The first Pipe Roll is preserved from 1131, the first Receipt Rolls from Henry II.'s reign, and the first Memorial Rolls from that of John; the twelfth-century Plea Rolls witness a well-developed judicial organisation. In a third stage the constant growth of business and staff produced recurring subdivisions of gov. depts. and their records, as, for example, the Curia Regis (*q.v.*) divided as regards its judicial functions into king's bench and common pleas. Moreover the depts. 'ceased to follow the king' and his perambulatory court, and by necessity acquired a fixed location for business, staff, and records. The Tudor period saw sev. innovations, new machinery of government, new courts, and the introduction of directing 'boards.' The chief contribution of the period was the implementing of an existing tendency: secretaries finally became, as secretaries of state, the chief executive officers for domestic and foreign affairs, and a special repository is provided for their papers. The modern Treasury and Admiralty were estab. in the succeeding century. The close of the eighteenth and the first three-quarters of the nineteenth centuries were a period during which the administrative divs. which had evolved from medieval times were reformed and modernised.

The first repository for official documents was in the Treasury of the Receipt in Westminster, where, save for a short period in the Tower during the fourteenth century, records were housed until the opening of the nineteenth. The ever more numerous sections of administration, however, began to look after their own records, in repositories in many places in London. The work of scholars like Dugdale, Madox, and Rymer, whose *Fœdera* appeared in 1704-17, caused a growing awareness of the treasures of historic material which lay in the neglected records. In 1703 House of Lords committees were set up to consider 'the Method of keeping Records in Offices' and 'Ways to remedy what shall be found to be amiss.' Their reports appeared in 1719; in 1732 there was a report on the fire in the Cotton Library, and others of the same century dealt with specific repositories. It was not until 1800, however, that a truly comprehensive report appeared, namely, that of the 'Select Committee appointed to enquire into the State of the Public Records.' A series of six commissions, collectively called 'The Record Commission,' was appointed, and produced reports in 1812, 1819, and 1837. Criticism of their work led to inquiries by a House of Commons Select Committee, whose report of 1836 included a plan for the collection of public records into one place under one authority, the former being Chancery Lane, and the latter the master of the rolls.

The first and most important of the statutes by which the work of the dept. is still regulated is the Public Record Office Act of 1838, resulting from the report of 1836. An Order of 1852 en-

larged the field of public records to which the Act applied. An Act of 1877 set up a procedure to determine whether or not any given class of documents were of sufficient 'value to justify their Preservation' in the P. R. O., and to regulate their elimination if they were not. An Act of 1898 extended from 1715 to 1660 the dates of documents to which the Act may apply.

The existing situation is as follows. All documents in gov. depts., and divs. (except the court of probate) of the supreme court and in older royal courts, are in the charge and superintendence of the master of the rolls and may be, and are removed into his custody by 'counter-signed warrant.' The P. R. O. has absolute discretion as to the administration of these, usually known as the legal section. For 'departmental' records, though many transfers have been made, no warrant has in practice been used; thus they are held to be still the property of the transferring depts. (though in charge and superintendence' of the master of the rolls) who may requisition and withdraw them, and are prime movers in making transfers, and in controlling their frequency, volume, and scope, and the extent to which the public may have access to them; the P. R. O. has, however, a recognised advisory capacity, and the master's rules lay down conditions under which transfers will be accepted. The records of the state paper office occupy a position midway between the two above. All home and foreign documents down to 1782 are classed as 'state papers,' and are held in the same formal custody as 'legal' records. Those of subsequent years are, with later records from the Foreign and Home Office, classed as 'departmental' records. The date 1782 was chosen (in 1909) to denote the official differentiation of the secretary of state's office into separate colonial, foreign, and home depts. The records of the Colonial Office are, however, classed as 'departmental' records whatever their date, because that office does not wholly originate from the secretary of state's activities. Legal and departmental records are treated equally in technical considerations of storage, repair, etc., notwithstanding their difference in status. It should be noted that 'legal' is a misleading term as applied to the records of most medieval courts, since they are in fact preponderantly administrative.

The conservation of the records includes their assembling and housing, and the elimination of unwanted documents; their sorting, numbering, labelling, and listing, and their distribution and packing; the provision of summaries of their location; and their repair and binding. The making of the records available to students entails the provision of means of reference and of public search rooms, and includes photographic facilities and pubs. by the P. R. O.

The Act of 1877 dealt with the elimination of documents, being specifically designed to prevent not improper destruction, but only unnecessary preservation. The master of the rolls was

empowered to make rules on the subject, and the first (1882) set up a body of inspecting officers, at least three in number, plus a representative of the dept. concerned. They were to submit schedules of documents to be destroyed, to be laid before Parliament. Under new rules of 1890, still current, documents existing or 'about to exist' in gov. depts. are subject to a schedule prepared in gov. depts., but then submitted to the inspecting officers. To the end of 1948 seventy-four schedules of legal and 308 of departmental records were made.

A committee of 1943 divided the life of modern records into three phases; the first comprised files in current use; the second those needed only for occasional reference; the third those no longer normally required. The second phase had often resulted in neglect, and a permanent repository was required. By 1948 five stations on an incomplete extension of the underground railway had been taken over and utilised, in a process known as the 'Limbo' scheme.

The use of photography has been developed, and photostat machines were employed during the First World War. In 1910 the large macrophotograph machine was introduced.

Activities of the P. R. O. outside the Act include the supervision of manorial records and par. tithe apportionments. The Historical MSS. Commission (q.v.) has carried on from the P. R. O. the work on papers and MSS. of private families and institutions. Under the commission was created in 1945 a national register of archives to organise the collection of information about and the compilation of a central index of private and local archives of all dates and kinds. The boards and commissions of nationalised industries have an obligation to consult the P. R. O. about their records. See Royal Commission on Public Records (1910), *First Report*, 1912; M. S. Giuseppe, *A Guide to the Manuscripts preserved in the Public Record Office*, 1923, 1924; V. H. Galbraith, *Introduction to the Use of Public Records*, Part I: *Introductory* (H.M.S.O.), 1949.

Public Relations Officer, head of an information div. in a gov. dept. or other body. He is the normal channel of information between the gov. dept., municipal corporation, public utility service, or other body, and the press or public. Some P. R. Os. or press officers were introduced into gov. depts. after the First World War, but it was only in the early part of the Second World War that separate P. R. divs. became a part of the organisation of all but the smallest depts., and the Ministry of Information was set up with functions which included the provision of common service facilities for depts. requiring publicity material. Home information services expanded rapidly during this time. In the period between the setting up of the Central Office of Information on April 1, 1946, emphasis shifted from publicity connected with the war-effort to publicity concerning the

national economic difficulties, and the more important measures of social legislation. The Central Office of Information (unlike the Ministry of Information, which it succeeded) has no responsibility for the policies underlying information projects, but is solely a common service technical agency working at the request and to the requirements of the ministerial dept. The idea of using publicity for any project often originates with an administrative branch or div. of the dept., and the P. R. O. or press officer, in addition to advising on the type of publicity most likely to be effective, is responsible for executing that part of the publicity which is organised departmentally (e.g. ministerial press conferences and the briefing of voluntary organisations working in conjunction with the dept.). He also secures the co-operation of the Central Office of Information in the production of publicity material for which the Central Office is responsible technically (e.g. press and poster advertising, films, booklets). On occasions the idea of using publicity originates with the P. R. O. or information div. and not with the administrative div. concerned. This is partly because the information div., through its wider contact with the public and the organs of public opinion, may become aware in advance of the administrative div. that a particular problem or situation is developing which may call for the use of publicity; and also partly because other officers of the information div., being recruited mainly from the press or advertising world, are by their training and experience more alive than the administrator can expect to be to the contributions which publicity can make to the attainment of administrative ends. Three main criticisms emerge from the evidence given recently by the Newspaper Proprietors' Association and the Newspaper Society to a Treasury committee on the services performed by press offices in departmental divs.; that press offices tend to become apologists for their depts., and are reluctant to give information which would present their dept. or its policy in an unfavourable light; that they prevent direct contact between a newspaper representative and the administrative head of the branch or div. concerned with the subject-matter of the inquiry; and that press officers too often tend to regard their obligation to the press as discharged by the issue of a written official handout, and are loath to supplement the handout (or 'release') on request by background information and guidance. But overriding conditions govern the work of gov. depts., including parl. privilege and the right of the House of Commons to first-hand knowledge of certain governmental or departmental decisions; and again security considerations may be involved, or again the pub. interest might be ill-served by premature publicity.

Public Revenue. The income yielding assets of the state (Britain) are the Crown lands and certain investments, such as shares in the Anglo-Persian Oil Company and in the Suez Canal. Dividends from

these shares are paid directly into the Consolidated Fund. The commissioners of Crown lands collect the rents arising from the properties and pay over the proceeds as net revenue. Of the fees received by depts., the receipts of the post office are the largest, so large, in fact, that the post office is classed as one of the revenue depts. Many other depts. collect minor sums and some pay these receipts directly into the Consolidated Fund. But the majority treat their receipts as appropriations in aid, the receipts being paid into the paymaster-general's cash account, where they are placed to the credit of the services concerned and the depts. draw a proportionally smaller sum from the Exchequer for their voted expenditure. But all these sources of P. R. are trifling compared with taxation, a fact which was still further emphasised during the Second World War when the rate of income tax and surtax rose very sharply. The Board of Inland Revenue collects direct taxes, the chief items of which are income tax, surtax, and estate duties; while the collection of indirect taxes is the prov. of the Board of Customs and Excise. The accountant and comptroller general, who is the head of the financial dept. of the Board, receives from the local collectors a statement of receipts (and payments for expenses), and from the surveyors' reports he can ascertain the amount of duty which should have been collected and paid in. The accountant and comptroller general transfers money daily from the general account of the commissioners of Customs and Excise to the Consolidated Fund at the Bank of England, retaining a certain sum for current expenses. In order to avoid unnecessary transfers of money the revenue depts. draw upon their receipts for expenses, and moneys so used are treated as advances on account of the vote. The Board of Inland Revenue treat departmental expenditure in the same way. They too draw money from their general account to pay for rate expenditure, and the money is periodically repaid by the Treasury.

The taxation and other sources of P. R. (Great Britain) in the financial years 1938-39 and 1948-49 were as follows:

	1938-39	1948-49
	£ million	
Inland revenue:		
Income tax	335.0	1,367.6
Surtax	62.5	97.9
Death duties	77.4	177.1
Stamp duties	21.0	56.4
Profits Tax (National Defence Contribution)	21.0	199.1
Excess Profits Tax	—	79.8
Other inland revenue duties	1.6	0.7
Special contribution	—	79.4
Customs and Excise:		
Customs	226.3	823.3
Excise	114.2	733.5
Motor vehicle duties	35.0	52.7
Sale of surplus war stores	—	99.6

1938-39 1948-49
£ million

Surplus receipts from certain trading services	—	28.0
Post office (net receipts)	9.5	—
Post office fund	1.4	—
Broadcast receiving licences	—*	11.7
Crown lands	1.3	0.9
Receipts from sundry loans	5.7	17.7
Miscellaneous	12.9	180.6
Ordinary revenue total.	927.2	4,006.6
Post office	79.0*	152.7
Income tax deducted from excess profits tax post-war refunds	—	8.7
Self-balancing revenue total	79.0	161.4
Total ordinary and self-balancing revenue	1,006.2	4,168.0
Total other receipts, repayments, etc.	190.2	382.0
Grand total gov. receipts	1,196.4	4,550.0

* Included in post office self-balancing revenue.

Most modern systems of state revenue present essentially the same features as that of Great Britain, though the individual sources may go by different names. In the above list the heads are merely popularly designated, and the classification, however convenient, is economically as unscientific as the assumed div. into tax receipts and non-tax receipts. A classification more in accordance with old economists is that into taxation direct and indirect, and Crown revenue. But modern economists have repeatedly shown not only that the incidence of so-called direct taxes is often on other persons than those primarily intended to bear the burden, and, conversely, that many indirect taxes are in reality direct (e.g. some stamp duties are a direct deduction from income, while frequently indirect imposts on commodities remain on the shoulders of those from whom they were originally collected in spite of the economic assumption that they are passed on to the consumer), but that the whole of the revenue from the post office and other state monopolies, together with the receipts from stamp duties, is, in reality, taxation, though its precise incidence may be difficult to determine in particular cases. It is not a little anomalous that the most productive source of P. R. should be a tax which in its origin was no more than a temporary war tax (see INCOME TAX). The pre-1932 Brit. system of restricting customs and excise duties to a more handful of commodities was not only advantageous to trade generally, but conducive to a high yield of revenue (see on this EXCISE DUTY; CUSTOMS DUTIES).

A circumstance that made the Brit.

levy more productive than those of most other countries was that it was designed exclusively for purposes of P. R. uncomplicated by a policy of protective duties. It is clear, too, that the greater the number and amount of protective duties, the less must be the revenues from purely customs duties, a deficiency which must necessarily be made up in other ways, as, for example, by the *octroi system* (see OCTROI).

The total public revenue in Great Britain for various financial years since 1880 is as follows:

	£
1880-81	81,872,000
1900-01	140,124,000
1913-14	198,243,000
1918-19	889,021,000
1919-20	1,339,571,000
1920-21	1,125,985,000
1929-30	814,971,000
1937-38	875,718,000
1938-39	930,935,000
1939-40	1,049,189,000
1940-41	1,408,867,000
1941-42	2,071,057,000
1943-44	2,819,851,000
1944-45	2,819,851,000
1945-46	3,281,450,000
1946-47	3,311,223,000
1947-48	3,841,559,000
1948-49	4,006,591,000

Local Taxation Revenue. The total amounts received by local authorities in England and Wales from the rates in the

financial years ended March 31, 1914, and specified years thereafter were:

	£
1913-14	71,276,000
1930-31	149,896,000
1935-36	164,914,000
1940-41	203,892,000
1945-46	221,000,000
1946-47	239,000,000
1947-48	278,000,000
1948-49 (estimated)	266,801,000

SCOTLAND	£
1944-45	24,285,000
1945-46	23,306,000
1946-47	28,019,000
1947-48	32,073,000

In addition to block grants (£59,129,000 in the United Kingdom in 1947-48 and £8,580,000 in Scotland) under the Local Government Acts 1929 to 1946, local authorities receive other large gov. grants, e.g. from the Ministry of Education for purposes of education, from the Home Office for police expenditure, from the Ministry of Health for housing, etc. They also receive large sums from gov. depts. as reimbursements in respect of expenditure on emergency services. Total gov. grants to local government authorities in 1946-47 amounted to £252,113,000 for England and Wales, and in 1944-45, £25,874,000 for Scotland.

United States.—The P. R. for the U.S.A. for the years ending June 30, 1947, and June 30, 1949, was as follows:

General and Special Accounts:

Internal revenue:

	1947 \$	1949 \$
Income tax	29,305,568,454	29,482,283,759
Miscellaneous internal revenue	8,049,467,726	8,348,022,991
Social security taxes	1,644,315,349	1,913,145,400
Taxes upon carriers and their employees	380,057,125	563,832,724

Railroad unemployment insurance contributions

for administrative expenses	14,171,002	9,739,295
Customs	191,078,260	381,484,796
Surplus property	2,885,796,668	589,078,103
Other miscellaneous receipts	1,944,867,485	1,482,918,452

Total budget receipts	41,718,325,110	42,773,505,520
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Deduct:

Appropriation to federal old-age and survivors' insurance trust fund	1,459,491,921	1,690,295,705
Refunds of receipts		2,837,542,005
Net budget receipts	43,258,833,189	38,245,667,810

Trust Accounts, etc.:

Federal old-age and survivors' insurance trust fund	623,332,497	1,923,769,344
National service life insurance fund	1,504,130,636	690,051,535
Railroad retirement account	322,601,274	635,401,876
Unemployment trust fund	1,289,398,022	1,173,175,672
Other trust funds and accounts	1,504,515,849	1,302,028,241
Total receipts,	5,244,027,279	5,724,426,671

The omission of cents in the separate items accounts for the apparent inaccuracy in certain totals.

Public School, term which has greatly varied in meaning at different times. It can be used in a wide sense to denote (as in the U.S.A.) a school which is not under private ownership and control. In England, however, the term has gained a special, narrower meaning. According to the terms of reference of the Fleming Committee (1912) P. S. are 'schools which are in membership of the governing bodies' association or the headmasters' conference.' The election of a headmaster to the latter of those organisations normally depends on his school (1) possessing a certain amount of independence; (2) undertaking some post-graduate certificate work; (3) containing a certain number of boys over the age of thirteen; (4) having a number of former pupils at univs. Such schools number rather fewer than 200. Slightly less than half are 'independent' schools, the rest being aided by grants from local education authorities or from the Ministry of Education. They are controlled by a board of governors or other constitutional authority. P. S. were often founded for religious or philanthropic purposes, some of them dating back to the Middle Ages (Winchester, 1382; Eton, 1440), but the majority were founded in the eighteenth and nineteenth centuries. Eton is said to have been the first grammar school to receive the name of P. S., the meaning then being that scholars might come to it from any part of England, and not, as was generally the case, from the immediate neighbourhood of the school. The exclusive P. S. have been frequently criticised because they began as foundations for poor scholars and grew into a privilege of the wealthy. Both Eton and Winchester were enjoined in their charters to provide for free place pupils, 'pauperes et indigentes,' but, like many other P. S., both in time estab. exclusive traditions. This exclusiveness has often been the chief difference between many a P. S. and the old grammar schools from which sev. P. S. originated. Features common to all P. S. are the prefect system, religious teaching, a high regard for team games, and an emphasis on character building. But these features also prevail in many grammar or other secondary schools, private or otherwise, and it is therefore often hard to define a P. S. otherwise than by reference to the important social and economic aspect. A large number of P. S. are residential, which makes them more expensive, and although some have always been day schools, even these, on account of their social pre-eminence, have been in a position to choose their pupils carefully. But though in the past many boys went to P. S. from recognised preparatory schools, many were able to enter by obtaining open scholarships. Since 1944, when the Education Act allowed local authorities to provide education of the P. S. type where this seemed to suit parents and pupils, many boys have gone to famous P. S. by way of the qualifying common entrance examination taken by children at the age of eleven. It may

be doubted whether the traditions of the P. S. differ substantially from those of the endowed grammar schools. Both groups had suffered a great decline by the early nineteenth century, and were in need of reform. The Public Schools Act of 1868 was the outcome of a royal commission set up in 1861 to investigate the working of nine schools—Eton, Harrow, Winchester, Shrewsbury, Charterhouse, Rugby, Westminster, St. Paul's, and Merchant Taylors—but the last two were subsequently omitted from the operation of the Act of 1868. It appeared evident that some schools at least had instituted reforms in the standard of accommodation, curriculum, and moral tone before the commission was appointed. About this time a number of new P. S. were founded. These include Marlborough, Cheltenham, Radley, and Lancing, all in the 1840s; Wellington in the 1850s; and Clifton in the 1860s. Canford, Stowe, and Bryanston were estab. after the First World War. The P. S. revival had much influence in the general state of education. These largely exclusive schools heralded the beginnings of a national system of education. The headmasters' conference was estab. by Thring of Uppingham as a protest against the exclusion of the seven schools dealt with in the Public Schools Act from the Endowed Schools Act of 1869. In 1910 an association of governing bodies of P. S. was founded. Two years later a similar association in respect of girls' schools was formed, the schools belonging to it being generally termed P. S., although the term is more commonly used in connection with boys' schools. The Eng. P. S. has, since 1850, been responsible for educating a very large proportion of the leading figures in Eng. public life. Among the most famous P. S. masters are Arnold of Rugby (q.v.), James of Eton, Samuel Butler of Shrewsbury (q.v.), Thring of Uppingham (q.v.), and Henry Montagu Butler of Harrow (q.v.). The chief contribution made by Thring and others to the school world was to restore to it the ideal of the Christian gentleman. While recognising the great achievement of P. S. in scholarship, it is not unfair to assume that the development of the mind is not a primary consideration, and that the chief concern is the moulding of an upright character through the corporate life of the school, and the training of a good citizen, though critics, often from the P. S. themselves, have complained that they encourage class isolation. This criticism, however, has lost much of its force since the beginning of the twentieth century, and especially since 1911. See W. O. Lester-Smith, *To Whom do Schools Belong?*, 1913; Sir R. Livingstone, *Education for a World Adrift*, 1941; H.M.S.O., *Public Schools and the General Educational System*, 1944; J. F. Wolfenden, *The Public Schools Today*, 1919; and *The Public Schools' Year Book*.

Public Service Vehicle is defined in Sect. 121 of the Road Traffic Act, 1930, as 'a motor vehicle used for carrying

passengers for hire or reward other than a vehicle which is a contract carriage adapted to carry less than eight passengers; or a tramcar or trolley vehicle.' A 'contract carriage' is defined in the same Act as a 'motor vehicle carrying passengers for hire or reward under a contract express or implied for the use of the vehicle as a whole at or for a fixed or agreed rate or sum.' The Act of 1930 gave a local authority, who, under any local Act or Order are operating a tramway, light railway, trolley vehicle, or omnibus undertaking, powers to run P. S. Vs. on any road within their dist.; and also with the consent of the Traffic Commissioners for the traffic area on which any other road is situate, on that road without having to obtain a special par. Act or Order. Under the Act of 1930 the local authority had to obtain a licence from the Traffic Commissioners, but the Act has been amended by the Transport Act, 1947, the general effect of the amendment in this particular being that a passenger road transport service is exempted from the necessity of obtaining a licence under the provisions of the Road Traffic Act; i.e. the types of vehicles to be employed and stopping places must be approved by the licensing authority for the area. The licensing authority, formerly the Traffic Commissioners, is now renamed the Licensing Authority for Public Service Vehicles.

Public Stores. The Brit. Gov. appropriates certain marks, the most familiar of which is the broad arrow, for the purpose of distinguishing P. S. By the Public Stores Act, 1875, it is a misdemeanour punishable by imprisonment up to two years to put any of these marks without authority on non-gov. stores. To obliterate such marks so as to conceal the fact that stores are gov. property is a felony punishable with penal servitude up to seven years.

Public Trustee, gov. official whose office was opened in 1908 under the Official Trustee Act, 1906, and through whom the state acts as executor and trustee under a will, or as trustee under a settlement and in other similar capacities. The value of the trusts accepted up to the end of the financial year 1948-49 was over £552,679,000. The facts of any trust, new or old, in which it is desired that the P. T. should act may be brought to his notice by letter or interview. The appointment is effected in the same way as a private trustee, or by an order of the court. The P. T. can act solely or jointly with others. Executors who have obtained probate can transfer their duties to him under an order of the court. He can also act as an administrator with or without the will annexed. Strict secrecy is observed in all matters dealt with in the dept. of the P. T. Accounts in simple form are furnished to the beneficiaries as required.

Public Utilities. The chief services covered by the leading P. U. are the supply to the public of water, gas, electricity, and tramways.

Water.—About two-thirds of the co. bors., nearly all non-co. bors., and half of

the urban dists. of England and Wales control their own water supply. In London in 1902 the London Water Companies were taken over by the Metropolitan Water Board, under the Metropolitan Water Act of that year. Comprehensive provisions relating to water supply are contained in the Water Act, 1945, under which the minister of health is given the duty of promoting the conservation and proper use of water resources and securing the effective execution by water undertakers, under his control and direction, of a national policy relating to water. *See further under WATER SUPPLY.*

Gas.—Before the nationalisation of the gas industry there were some 1046 gas undertakings in the United Kingdom, of which 275 were local authorities, 405 statutory companies, and 366 companies working without statutory powers. The ann. make of gas was approximately 418,000,000,000 cub. ft., of which about 36.5 per cent was made by local authorities. In addition, about 52,000,000,000 cub. ft. of gas was purchased from coke ovens. The ann. amount of gas sold at the present time (1950) is at least double that sold in 1920, and over 30 per cent is used for industrial and commercial purposes. Gas production yields also valuable residuals such as coke, tar, ammonia, etc. Since the Gas Regulation Act, 1920, the normal method of charging for gas has been changed from the volumetric (cub. ft.) basis to the thermal basis, under which the charge is based on the number of heat units contained in the gas. For this purpose the unit of heat is the therm (100,000 Brit. Thermal Units), and the number of B.Th.U. produced by the combustion of 1 cub. ft. of gas under certain conditions is known as the calorific value. Normally, gas is subject to tests for calorific value, purity (freedom from sulphuretted hydrogen), and pressure (minimum 2 in.).

The gas industry was nationalised by the Gas Act, 1948, which estab. twelve Area Gas Boards to which existing gas undertakings were transferred. The Gas Council exercises certain functions, mainly advisory and financial, in respect of the Gas Area Boards.

Electricity.—*See BRITISH ELECTRICITY AUTHORITY.*

Tramways.—General legislation relating to tramways and light railways is contained in the Tramways Act of 1870 and the Light Railways Act of 1896 and 1912, which were up to 1919 administered by the Board of Trade, after which they were taken over by the Ministry of Transport under the Act of 1919. *See further under TRAMWAYS.*

Public Utilities in the U.S.A.—In the main the chief public utility owned and operated by most Amer. cities is the water supply. In some conspicuous cases enormous sums, running into millions of dollars, have been spent to bring a supply of pure water from great distances. The supply of electricity is mainly in the hands of private corporations. Before the Second World War these produced 96,000,000,000 kilowatt hours. The

installed generating machinery totalled 14,500,000 h.p. Approximately 24,850,000 customers were served, nearly 20,500,000 being householders. About 70 per cent of the people in the U.S.A. now live in electrically wired homes. Electric service is available to practically every community of 1000 pop. or above, and to 50 per cent of the communities between 250 and 1000 pop. The number of electrified farms is estimated at 700,000.

The supply of gas is also largely in the hands of private corporations. Statistics issued before the Second World War showed that the gas industry had 15,800,000 customers who bought nearly 2,500,000,000 cub. ft. of gas. This includes both manufactured gas and a vast supply of natural gas (g.r.). In some instances this is piped for great distances. For instance, natural gas from W. Virginia is piped nearly 300 m., supplying customers *en route* and also in the distant cities of Cincinnati, Ohio, and Covington and Newport, Kentucky. Street railways are almost entirely privately owned by corporations, and there is no city of any size which has not a complete network of them.

Public Works Administration, *see* WORKS AGENCY, FEDERAL.

Public Works Loan Board, created in 1817 for the purpose of advancing money to municipal authorities for public works. These include conservation of rivers, or main drainage, prisons, public libraries and museums, housing, waterworks, and any works for which a local sanitary authority is empowered to borrow under the Public Health Acts. Before advancing money the commissioners must take security for repayment with interest at the rate authorised by the special Act relating to the loan. The security is generally on the rates, but it may be on any other property. By the Public Works Loans Act, 1897, the rate of interest on loans secured on local rates was reduced to not less than 2½ per cent. If the loan is not repaid the commissioners have power to enter into possession of, and, if necessary, sell, the mortgaged property. By the Local Authorities Loans Act, 1943, a temporary measure passed to check competition by local authorities, after the Second World War, in the open market, local authorities are prevented from so borrowing (subject to certain exceptions) and must obtain their capital requirements from the gov. through the P. W. L. B. Repayment to the board is by means of yearly annuity and the privilege of repaying the debt before its due date can be allowed only by paying a fine to the board depending on current interest rates. The rate to be paid by the local authority is ½ per cent above that at which the gov. is able to borrow. Limited permission to borrow without recourse to the board is given in certain cases. This is important to the local authorities as it may enable them to borrow at lower rates and maintain contact with their local markets of small investors. There are other exceptions to the rule that all borrowing must be through the P. W. L. B.; the local

authority may borrow from trusts and charities under its control; effect a temporary loan pending the receipt of revenue; borrow from another local authority which holds funds which it is empowered to lend; or borrow by stock, to redeem a previous stock issue. Local authorities may also borrow from their sinking funds, reserves, or other internal resources. The current rates of P. W. L. B. interest were fixed in June 1945 at 2 per cent on loans for not more than five years; 2½ per cent on loans for more than five, but not more than ten years; 2½ per cent on loans for more than ten, but not more than fifteen years; 3 per cent on loans for more than fifteen, but not more than thirty years; and 3 per cent on loans for more than thirty years. During the financial year 1947-48 the commissioners advanced loans amounting to £246,119,648, 78 per cent of which was for the purposes of the Housing Acts. The average rate of interest was £3 0s 10d. per cent in 1945-46; £2 10s 6d. per cent in 1946-47; and £2 12s. 2d. per cent in 1947-48.

Public Worship Regulation Act, *see* ECCLESIASTICAL COURTS.

Publishing (Lat. *publicare*, to make public property), term generally applied in a restricted sense to the process of selecting, printing, and issuing reading matter for distribution to the public. Even in this limited sense it includes the issue of newspapers, magazines, and other periodicals, musical scores, directories, time-tables, and highly specialised works of reference. If, however, the material pub. or made known is not otherwise specified, the term is generally held to mean the P. of books. It signifies the activity of that part of the book trade which is the link between authorship and printing on the one hand and bookselling on the other. It covers a wide field which may conveniently be divided into educational and general. Educational P. includes the works of scholarship, research, and instruction issued by the learned presses attached to the major univs. in Europe and the U.S.A. or by independent firms of publishers who specialise in this field, sometimes combining it with general P. The term 'general P.' covers the issue of all the miscellaneous books consisting of religious and philosophical writings, poetry, plays, fiction, biography, memoirs, travel books, expositions of hist., science and art, belles-lettres, and books for children (other than school books). The work characteristic of P. in this field is the reading, criticising, and selecting of MSS.; the editing, planning, and commissioning of books; the negotiating of agreements with authors, editors, artists, and literary agents; book production (involving decisions of the kind and quality of paper, size of page, number of pages, type and binding styles); and finally the marketing of the finished product. The first function is the relationship between the publisher and author. Until recent times it was not unusual for a publisher to acquire the copyright in an author's work in return for either an outright payment or a royalty on copies sold, but now it is more

usual for the author to lease to the publisher the exclusive right to print and issue the work in book form. There are many varieties of publishing agreements framed to meet special cases. Most contracts provide for books to be financed by the publisher and for the remuneration of the author by way of royalty (normally a percentage of the retail price of each copy sold). Some books, however, are pub. on a 'half profits' or 'half proceeds' basis, the author and publisher sharing equally; others are subsidised as propaganda by commercial concerns, political groups, reformist or religious bodies, but these are a minute proportion of publishing output.

Historical.—To-day the distinction between the bookseller and publisher is, with a few exceptions, firmly estab. In classical and medieval times, however, the bookseller employed copyists and became the producer (or publisher) of his own stock-in-trade. Even after the introduction of printing, bookelling, printing, and P. were conjoined occupations (see BOOKSELLING; PRINTING). In England the book trade was consolidated by the incorporation of the Stationers' Company in 1557 during the reign of Queen Mary. The charter was confirmed by Queen Elizabeth in 1559. The company included both printers and booksellers (or stationers), both functions often combined in the same person. It was vigilant in the protection of its monopolies and became an instrument of gov. in suppressing seditious and, in the religious field, controversial literature. Towards the end of the sixteenth century the bookseller began to separate himself from the printer, his business being to secure the copyrights of the books he wished to sell and to employ a printer to have them printed, and even—a further new departure—to engage authors to write. He also helped to stock his shop by exchanging books with fellow booksellers. These developments were often opposed by the printers, who resented their economic dependence on the bookseller. The tendency grew and the bookseller-publishers in Elizabethan times became the influential members of the Stationers' Company. Notable among them were Simon Waterson, the publisher of Camden, Wm. Ponsonby, Spenser's publisher, and Humphrey Cooper, whom Bacon authorised to publish his works. The monopoly system was a further grievance of the small printer-publisher. The system was strengthened by James I., and the Stationers' Company operated under the control of the Crown. For instance, the privilege of printing the Bible was vested in a group of publishers in partnership, including the king's printer, Robert Barker, who pub. the authorised version in 1611. In addition to the Bible, other monopolies were grouped as Ballad Stock, Irish, Lat., and Eng. Stock. The monopoly system encouraged pirates, and the prevalence of pirated eds. (not necessarily corrupt texts) in Elizabethan and Jacobean times was an indication of the difficulties small printer-publishers had in

making a living. The 'free' publishers lost the day, and finally for political reasons the Star Chamber decree of 1637 placed the book trade under strict licence and supervision. The power of the Star Chamber was, however, declining, and from 1640 to 1643 the licensing orders, and even the necessity to register with the Stationers' Company, were neglected. Parliament, however, became nervous of the freedom enjoyed by the publishers, and in 1613 issued an ordinance which invoked a censorship similar to that under the Star Chamber. It was against this ordinance that Milton wrote—and pub. without licence—his *Areopagitica* in 1644. Fifty years later his hopes were realised, and the licensing of the press was abolished (see also PRESS; FREEDOM OF THE). Although for the most part literature suffered from the conflicts of the times, poetry owed much to Humphrey Moseley, the publisher of Milton, Cowley, and other contemporary poets. With the Restoration licensing control was increased. The Licensing Act of 1662 took away the power hitherto exercised by the Stationers' Company and placed it in the hands of a newly created official, surveyor of the inprimery and printing presses. The trade, still in its traditional centre in St. Paul's (churchyard, struggled on until the Fire of London destroyed the stocks of a large number of publishers. The Licensing Law lapsed, and trade began to revive. One of the leading publishers was Henry Herringman who took over some important copyrights from Moseley on the latter's death. Another publisher whose name is remembered is Samuel Simmons who bought the copyright of *Paradise Lost* from Milton for £10 (equivalent to about £150 at the present time). Simmons sold the copyright for £25 in 1680, and it later passed to Jacob Tonson the elder, whose activities dominated P. in the second half of the seventeenth century. With the growth of the reading public larger financial returns became possible. Authors who in earlier days had ignored or despised remuneration from the sale of their books, depending rather on the munificence of patrons, now began to look to the publisher-booksellers for the reward of their labours. Tonson, for instance, paid larger sums for the copyrights of current works than did his predecessors. Yet Dryden, for whom he pub., was far from satisfied.

In 1691 the Licensing Laws ended. With them also went the powers of the Stationers' Company in keeping a control which, although often perverted for political ends, had served as some measure of protection for the P. profession. The next step was the passing of the Copyright Act in 1709 during the reign of Queen Anne (see COPYRIGHT). This granted copyright for fourteen years for new books with the addition of a further fourteen years if the author survived the first term. Thus ended the practice of holding copyrights in perpetuity. A number of publishers were encouraged by the Act in the practice of co-operative P. Another

characteristic of the period was the replacement of patronage by subscription. P. Tonson continued to flourish and became the publisher of Addison and Steele. Pope's *Pastorals*, his first work, was pub. by Tonson, but for the majority of his works Pope went over to Bernard Lintot. Tonson was succeeded by his nephew, Jacob Tonson the younger. One other foremost publisher of the day deserves mention as he is a link with the twentieth century—Wm. Taylor whose business in Paternoster Row was taken over in 1724 by Thomas Longman, the founder of the House of Longman (*q.v.*). Longman had a share in the pub. of Johnson's *Dictionary* and his son, also Thomas Longman, was with other publishers, including John Murray (*q.v.*), founder of the firm of that name, concerned in Johnson's *Lives of the Poets*. Two other publishers who shared in that venture were Thomas Cadell and Joseph Johnson, who later increased their reputation by becoming respectively the publishers of Gibbon and Cowper. Robert Dodsley is another publisher whose name is linked with that of Samuel Johnson. Johnson thought well of publishers, and unlike Dryden preserved amicable relations, which strengthened the professional status of both authors and publishers. One result of the Copyright Act of 1709 was to encourage the reprint of contemporary authors in cheap eds. This caused some resistance in the trade but was upheld by a decision of the House of Lords in 1774. Cheap books were a feature of the business built up by James Lackington, who was, it is said, the first to sell remainder vols. at reduced prices. From 1780 onwards the Minerva Press, which he ran, was turning out mystery novels to feed the circulating subscription libraries which, from their beginnings in Edinburgh earlier in the century, had become popular in London.

By the beginning of the nineteenth century the publishing trade had come to be a profession in its own right as distinct from bookselling. The publishers associated with the romantic movement in literature were Thomas Longman, son of the founder of the firm, and John Murray, the third of that name, also Charles and James Ollier, Shelley's publishers, and Taylor and Hessey, who pub. Keats, and later Edward Moxon, to whom Tennyson and Browning owed their early pub. Edinburgh, through the activities of Archibald Constable and the Ballantyne brothers, and with the rise of the House of Blackwood (founded in 1801), came to rival London as a literary and publishing centre.

The valuable literary properties of the Victorian era estab. the reputation of a number of famous publishing houses in addition to those already mentioned—Chapman & Hall, the publishers of Dickens, Trollope, and Meredith; Smith & Elder, of Thackeray; Chatto & Windus, of Swinburne; George Allen, who was associated with Ruskin in a joint publishing venture. Scottish publishers who in course of time estab. houses in London

were Adam Black, who took over the *Ency. Brit.* in 1827 from Constable when the fortunes of that house declined, Wm. Collins, John Blackie of Glasgow, while Daniel Macmillan, also from Scotland, set up first as a publisher and bookseller in Cambridge in 1843. The increasing market for books of all kinds presented the trade with many problems resulting from free and uncontrolled competition. The Booksellers' Association, which was formed in 1850 and included a number of publishers, endeavoured to prevent books from being sold below their pub. price. The association, which had a short life, failed in this purpose, which was not accomplished until the Net Book Agreement was negotiated in 1901 by the Publishers' Association founded in 1896, Sir Frederick Macmillan being chairman at the time of the agreement.

Meanwhile publishing enterprise in the Brit. Isles had its parallel in the U.S.A. in the nineteenth century. Not being parties to the International Copyright Convention, Amer. publishers were free to reissue the works of popular Eng. writers without payment, a practice which Dickens denounced during his first visit to America in 1842. With the estab. of London branches of reputable Amer. firms, notably Putnam & Sons, Scribner's, Harper Brothers, Lippincott's, Appleton's, and Ginn & Co., the necessity of linking the trade on both sides of the Atlantic by professional agreement became apparent and since then Eng. and Amer. P. has been closely associated. International co-operation was also the purpose of the International Publishers' Congress, which met for the first time in Paris in 1896 and at intervals since then in other European cities.

Towards the end of the century Wm. Heinemann, J. M. Dent, Fisher Unwin, Alfred Nutt, Gerald Duckworth, Edward Arnold, John Lane, and the firms of Hodder & Stoughton, Methuen's, Harrop's, and others were coming to the fore with new authors whose reputations stretched forward into the twentieth century. An outstanding venture of this time was the pub. of the standard classics of Eng. literature in substantial form and at a price within reach of the reading public which the advance of education had created. In this connection the names of Grant Richards and J. M. Dent should be mentioned, the former for the *World's Classics* series and the latter for the *Temple Shakespeare*, the *Temple Classics*, and *Everyman's Library* (*q.v.*).

During the First World War the P. trade had to face many of the problems which confronted it in a worse form twenty-five years later; chief among them was the destruction of stocks from air attack and the shortage of paper. The number of new books and reprints pub. in the United Kingdom declined from 11,500 in 1914 to 7700 in 1918, and from 15,000 in 1939 to 8700 in 1945. The difference between the figures for 1914 and 1939 is evidence of the increased activity of P. in the years between the wars, the peak year being 1939 with 17,100 titles.

Cheap eds., the growth of circulating libraries and of book clubs (*q.v.*), contributed to this increase. The book trade strengthened itself to meet the problem created by modern production methods by the formation of a joint committee (of the booksellers' and publishers' associations) to place some of the related needs of the publisher and bookseller on a basis of mutual co-operation. This was one result of a report by a delegation of publishers and booksellers sent to Germany and Holland in 1926 by the Society of Bookmen (a small, unofficial but influential body representing all aspects of the book world) to study trade organisation. The delegation was led by Stanley Unwin, an exponent of co-operation, who became president of the Publishers' Association in 1933 and was knighted in 1946. Another co-operative venture, initiated by Unwin, was the National Book Council set up in London in 1924, and later known as the National Book League, a valuable link between publisher, bookseller, and the reading public. In consequence of these and other movements P. was better organised than in 1914 to meet the difficulties of the Second World War, and one of the most notable effects of this was the exemption by the Brit. Gov., as a result of representations from all sections of the trade, of books from the purchase tax. In an effort to economise materials and labour, and at the same time to preserve some freedom of action, the Publishers' Association set up a technical advisory committee. As a result of its work a voluntary agreement without precedent in P. was reached on a 'war economy standard' of book production. Even in this way, however, it was impossible to maintain stocks of Eng. books, depleted during the winter of 1940-41 by over 20,000,000 vols. destroyed by enemy air attack. With this handicap the book trade had to meet the insistent demand for books both in the United Kingdom, among the forces abroad, and for export. Wartime restrictions were not completely relaxed until 1949 when there was a return to normal paper supplies. The costs of printing and binding were, however, doubled since 1939. This led to an increase in the price of books, although only by a half or a third. The value of the post-war trade in the United Kingdom accordingly rose to over £30,000,000 per annum (over a fifth being export) as against £10,000,000 in 1939. The number of titles pub. each year since the war was, on the other hand, lower than before the war, although the 1939 total of 14,904 was nearly equalled by the 1948 total of 14,686. The number of copies that these totals represent is not known, but in post-war practice there was a tendency to issue larger eds. than was the practice formerly. *See also* PAMPHLETS. *See* Sir Stanley Unwin, *The Truth About Publishing*, 1926, 1946; F. A. Mumby, *Publishing and Bookselling*, 1930, 1949; J. Hampden (ed.), *The Book World*, 1935; F. D. Sanders (ed.), *A Report on the Work of the Joint Committee*, 1939; J. L. Young, *Books: from the MS. to the Book-*

seller, 1948; J. Benn, *Publishing is a Craft* 1948; J. Milne, *Printer's Devil*, 1949; and M. Joseph, *The Adventure of Publishing*, 1949.

Puccini, La, *see* JOAN OF ARC.

Puccini, Giacomo Antonio Domenico Michele Secondo Maria (1858-1924), It. operatic composer, b. at Lucca, of a musical family. He studied under Bazini, and later under Ponchielli, at Milan. Ponchielli persuaded him to take part in a competition for a one-act opera advertised by Sonzogno, and he wrote *Le Villi* (1883); but the prize was won by Mascagni's *Cavalleria Rusticana*. *Le Villi* was, however, produced at Milan in 1884, and drew Ricordi's attention to P. He commissioned P. to write another opera, *Edgar*. This failed, but P. had his first great success with *Manon Lescaut* at Turin in 1893. Three years later he wrote his most popular work, *La Bohème*, and soon accumulated a large fortune from his music. He was the predominating figure in It. music in his time; and his operas which combine to some extent the sensuous melody of Rossini and Verdi with the richness of modern 'Impressionist' harmony, were exceedingly popular. His other works include *La Tosca* (1900); *Madame Butterfly* (1904); *The Girl of the Golden West* (1910); and *Turandot* (unfinished). *See* lives by A. Neiser, 1928; R. C. Merlin, 1939; V. Seligman, 1938; and F. Thiess, 1947.

Puck, otherwise Robin Goodfellow, mischievous elf in folklore. He figures in Shakespeare's *A Midsummer Night's Dream*, as well as in Goethe's *Faust*, and is also utilised by Dryden, Burton, and Ben Jonson. The character may have come to England with the Scandinavian or Dan. settlers, his Dan. name being *Pokker* and his Celtic *Puca*.

Pud, *see* POOD.

Puddingstone, *see* CONGLOMERATES.

Puddling, *see* IRON AND STEEL, *Steel and Wrought Iron*.

Pudens (fl. c. A.D. 60), Rom. senator, baptised by the apostles. His name he is identified with the P. mentioned by St. Paul (2 Tim. iv. 21). He was the father of St. Praxedes and St. Pudenciana and it is probably on the site of his house that the first Rom. basilica of Santa Pudenziana was built. *See* A. Bettrigiani, *La Basilica di Santa Pudenziana*, 1934.

Pudsey, municipal bor. of the W. Riding of York-shire, England, 4 m. E. of Bradford and 3 m. W. of Leeds. It has an important woollen trade, and possesses dyeing and fulling mills. Machinery is made, and iron and brass founding carried on. The name P. occurs in Domesday Book, but in the early sixth century P. and the neighbourhood appear to have been the centre of the considerable kingdom of Elmet, which retained its independence for more than 200 years after other more petty kingdoms had been subdued by the Saxons. The bor., incorporated in 1899 and enlarged in 1937, includes Fulneck, a Moravian settlement since 1745, and Farsley and Calverley. The cricketers John Tunnicliffe, Herbert Sutcliffe, and Leonard Hutton were born in P. Pop. 30,200.

Pudukottai, former native state of S India, between Tanjore and Madura. Between 1923 and 1947 P, with sev other states, had an agent of the governor-general in charge of the Madras States Agency. In Feb 1948 an agreement was signed between the ruler of P and the Indian Gov. providing for the merging of P in the Madras prov. Area 1100 sq m. Pop 438 300. The tn of P is well laid out and contains sev. fine buildings. Pop 26 100.

Puebla 1 State of Mexico on the high S plateau of Anahuac. It has a healthy

in the vicinity and marble is quarried. Pop 148 700.

Pueblo, term meaning a tn or vil in Spain or Sp America more especially a communal vil or settlement of Indians. In Amer archaeology P is applied to a tribal dwelling of the aborigines of New Mexico etc.

Pueblo, city and co seat of P co, Colorado U S A, 102 m S E of Denver. It is the second largest city of Colorado, and an important industrial centre, it is one of the greatest smelting centres in the U S A, and also manufs bricks and



PUEBLO AT TAOS NEW MEXICO

F A 4

climate and fertile soil. It is drained principally by the R. Salado and Atzac. Cotton coffee sugar etc are grown and cattle are reared. There are unexploited mineral resources. Area 13,124 sq m. Pop 1,294 700. 2 City of Mexico cap of the state of P on the R Atzac 65 m E S E of Mexico city. P ranks as the fourth largest city in Mexico. It is an old Sp city, founded in 1532 with broad streets many fine Sp colonial churches, and a Doric cathedral begun in the middle of the sixteenth century. There are many houses of the colonial period, with grilled windows and balconies and façades decorated with patterned and highly coloured tiles. The Teatro Principal built in 1790, claims to be the oldest existing theatre on the Continent. P is a busy manufacturing city and produces cotton and woollen goods leather goods soap, glass tiles, and pottery, tobacco and boots and shoes. Iron founding and distilling are carried on. Coal is mined

tiles. 85 per cent of the world's molybdenum is produced by the Climax mine. There are meat packing plants. There are oil wells stone and marble quarries, and coal mines in the vicinity. Pop 52 200.

Pueblo Nuevo del Terrible, tn of Spain in the prov of Cordova. 20 m N W of the city of Cordova. P is highly industrialised with foundries of lead zinc and other metals. It is the heart of a large mining area. Pop 17 900.

Pueblos, tribe inhabiting New Mexico and Arizona which embraces a number of nations related to each other by culture, but not by language, and remarkable for the fact that in their dist art to be found the most curious rock structures and ruins. They were discovered by Father Marcos de Niza (1539). See P E Goddard, *Indians of the South west*, 1921, and F H Roberts, *The Village of the Great Kivas on the Zuni Reservation*, 1932.

Puelche, tribe of S Amer Indians,

inhabiting Central Argentina. They were an offshoot of the Araucanians of Chile, and intermarried with the Patagonians and Pampas Indians. They migrated beyond the Negro R. The P. are nomadic in character.

Puentearreas, tn. of Spain, in the prov. of Pontevedra, on the R. Tea, 17 m. S. of Pontevedra, in a vine-growing dist. There are porcelain manufs. and a ruined castle. Pop. 13,600.

Puente Caldelas, tn. of Spain, in the prov. of Pontevedra, 7½ m. E.S.E. of the tn. of Pontevedra, with tin mines and sulphurous springs. Pop. 8,500.

Puente Genil, tn. of Spain, in the prov. of Cordova, on the Genil, 33 m. S. of the tn. of Cordova. Olive oil is produced, and linen goods are manufactured. Pop. 19,700.

Puente Nacional, tn. of Colombia, in the prov. of Santander, on the Rio Suarez, 11 m. S. of Velez, with coal and iron mines. Pop. 16,000.

Puerperal Fever, or Child-bed Fever, severe fever, occurring after childbirth. It is due to the presence of microbes (*Streptococci* and *Staphylococci*) in the blood, and may be caused by the retention of a piece of the placenta, the smallest portion being sufficient to cause serious symptoms. It may also be carried from one woman to another by a careless nurse or medical man. The symptoms usually appear in from two or three days, and begin with one or more chills, followed by a rapid rise of temp. and pulse, accompanied by sleeplessness, severe abdominal pains, with the lochia (vaginal discharge) becoming suppressed or fetid. The condition is extremely grave, that caused by the retention of placenta being perhaps a little less so than the other form. Peritonitis or septicemia (blood poisoning) may supervene. Treatment consists in removing the cause, if possible, and frequent uterine douching with an antiseptic fluid. Morphia may have to be resorted to to induce sleep when hot fomentations fail to relieve the abdominal pain sufficiently, while stimulants are sometimes considered necessary, and all food must naturally be fluid and easily digestible. Sulphonamides and penicillin are most useful drugs in curing P. F.

Puerperal Insanity. There is no special form of insanity peculiar to the reproductive period in the female, and the psychoses which do occur then do not differ materially from similar reactions in other periods of life. They belong to the infection-exhaustion group, and while they may exemplify organic-reaction types, there is an increasing tendency to believe that the infective exhaustive state serves as a precipitant of a latent reaction type of another kind (e.g. mania-depressive psychosis and schizophrenia) more frequently than was formerly believed. In such cases investigation has revealed a psychopathic make-up, either with a definite hist. of hereditary predisposition or of individual instability due either to constitutional or environmental factors. It has been shown that in the absence of other predisposing and precipitating fac-

tors, the existence of sepsis during the puerperium plays a relatively unimportant part, *per se*, in the causation of a psychotic breakdown. Knowledge that the child is illegitimate (especially where this is likely to involve serious social consequences), desertion by or death of the father, fear of childbirth, a neurotic attitude towards motherhood (preconditioned by relationships and conditions in the parental home), and a maladjusted married life, are all considered important predisposing factors. The importance of the effect upon the mother of the father's attitude towards the pregnancy and birth has also been stressed.

The puerperal psychoses are usually divided into three groups: (1) insanity of pregnancy, (2) P. I. proper, which includes all cases occurring within six weeks of labour, and (3) lactational insanity. The mental disorder of pregnancy is usually melancholia and its most important aspect is the danger of suicide. This is greatest when the delusions are self-accusatory in type, but they also frequently lead to an intense dislike of and unfounded accusations against the husband. Hallucinations may develop. The prognosis is very good in cases occurring before the fourth month. In psychoses which first appear after this, the prognosis still remains favourable but the condition frequently does not clear up until after the baby is born. When a breakdown occurs at the time of delivery or in the first two weeks of the puerperium, the psychosis usually takes the form of mania. The attack is commonly acute, food may be refused, and transitory delusions and hallucinations, both visual and auditory, may be present. Remissions followed by a recrudescence of the confused excitement are not uncommon. In the later stages of the puerperium, the disorder is usually depressive in character, with delusions of unworthiness, suicidal tendencies, and possible attempts at infanticide. The psychoses occurring during the period of lactation are usually melancholias of sub-acute type, with self-accusatory delusions and suicidal and infanticidal tendencies. With regard to the prognosis in psychoses occurring after delivery, it may be said, generally speaking, that the sooner they occur after the birth of the child the better the outlook. Those which first appear late in the lactational period tend to run a long course. See also **INSANITY** and **PSYCHOPATHOLOGY**. See Sir M. and T. Beaton, *Psychological Medicine*, 1926; R. G. Gordon, *An Introduction to Psychological Medicine*, 1936; D. K. Henderson and R. D. Gillespie, *A Text-book of Psychiatry* (6th ed.), 1944.

Puerto Ancon, see ANCON.

Puerto Barrios, tn. of Guatemala, on the gulf of Peten, on the Atlantic coast. It lies about 200 m. from the cap. and is the terminus of the international railways of Central America. Most of the import trade of Guatemala goes through this port. Pop. 27,000.

Puerto Bello, see PORTO BELLO.

Puerto Cabello, or **Porto Cabello**, port

with an excellent harbour, in Venezuela, S. America, situated to the N.W. of Valencia. After La Guayra it is the chief port of the state, and exports coffee, cocoa, sugar, hides, and skins. It is connected by rail with Valencia and Caracas; both railroads were built with Brit. capital. During the S. Amer. War of Independence it was surprised and taken by revolutionaries under Paéz, 1823. A wireless station was estab. at P. C. in 1912. There are shipbuilding facilities, corn and cotton mills, saw mills, and beef-packing plants, as well as cigarette factories. P. C. has considerable trade in hides, woods, copra, gold, and coffee. Pop. 32,000.

Puerto Cortes, formerly Caballos, largest port of Honduras, Central America, on the Atlantic coast. It is 207 m. from Tegucigalpa, and stands at the mouth of the Ulua R. The exports include hides, coffee, gold, rubber, and mahogany. Pop. 8000.

Puerto de Caibarien, see CAIBARIEN.

Puerto de Santa María, seaport of Spain, in the prov. of Cadiz, on the bay of Cadiz, 5 m. N.E. of the city of Cadiz. It has an export trade in sherry, and important manufs. of leather, glass, soap, etc. Bull fights take place here. It has declined in importance since the nineteenth century. Pop. 19,800.

Puertollano, tn. of Spain, in the prov. of Ciudad Real, 30 m. S.W. of the city of Ciudad Real. P. is the centre of a rich coal-mining area. Pop. 24,200.

Puerto Madryn, small port of Argentina in the ter. of Chubut, on the Golfo Nuevo. It was founded by the Welsh colonist, Parry Madryn, in 1885. It is the N. terminal of the Belgrano railway to Trelew and Rawson. Pop. 2500.

Puerto Mexico, see COATZACOALCOS.

Puerto Montt, tn. of Chile, cap. of Llanquihue prov., 670 m. S. of Santiago and 80 m. from Osorno (q.v.). It stands on a magnificent bay, and is the terminus of the S. railway, and point of embarkation for Chiloe and Punta Arenas. The port is much used by coasting steamers and serves a sheep-farming dist. Leather, wheat and timber are exported. Pop. 45,000.

Puerto Plata, port of Santo Domingo, W. Indies, on the N. coast of the is. It is a cable station connected with St. Thomas, Leeward Is. Cotton, coffee, bananas, and tobacco are exported. P. P. is of great commercial importance. Pop. 12,100.

Puerto Principe, or Camagüey: 1. Prov. of Cnba, bounded on the W. by Santa Clara. It has an area of 11,000 sq. m., and, its surface affording excellent pasturage, the chief industry is cattle raising. Copper-mining is carried on. Pop. 487,000. 2. City of Cuba, cap. of the prov. of the same name. It is the third city of the is., and is situated 340 m. from Havana, about 550 ft. above sea level. It has many anct. buildings, including the churches of La Morced and La Soledad. The first named was built in the early seventeenth century by missionaries of Our Lady of Mercy. Its high altar of

silver was made from 40,000 Sp. dollars. La Soledad was a seventeenth-century hermitage. Camagüey is the centre of a cattle-raising dist. and exports (from Nuevitas, with which it is connected by rail) cattle, hides, and sugar. Pop. (city) 80,500; (urb. dist.), 155,800.

Puerto Real (Portus Gadetanus in Rom. times), seaport and summer resort of Spain on the bay of Cadiz, N. of San Fernando. There are dry docks, wharves, etc., and a trade in wine and oil. Ship-building and repairing are carried on. Pop. 10,000.

Puerto Rico, formerly called Porto Rico is. of the W. Indies, one of the Greater Antilles, 60 m. E. of San Domingo. P. R. is a possession of the U.S.A. It is about 100 m. long, with an average width of 39 m., and has an area of 3435 sq. m. A mt. range traverses the is. from E. to W. The highest mt. is El Yunque in the N.E. (4985 ft.). From the mts. the ground slopes gradually to the sea on the N. and W., and more abruptly on the S. and E. The mt. slopes facing N. are deeply dissected by the many streams, which have formed narrow valleys and sharp ridges. The N. and E. slopes have a heavy rainfall, the S. and W. being drier, e.g. the rainfall of San Juan is 60 in., of Ponce on the S.W. coast 36 in., but both places enjoy the 'temperate' tropical climate of is. influenced by trade winds. The higher slopes are forested, and supply valuable timber, including sandal-wood and ebony. Agriculture is the chief industry and rum is manufactured. The fertile soil produces sugar, coffee, tobacco, oranges, pineapples, and other tropical fruits, sea-is cotton, and vegetables; over 700,000 metric tons of sugar are produced annually. Bat guano and phosphates are abundant. The fisheries are also profitable. Other industries include cigar- and cigarette-making and the manuf. of hats and embroideries. Minerals, including gold, silver, copper, iron, bismuth, mercury, platinum, tin, and nickel, are found but little worked, and there are extensive salt-works. A gov. agency, the Industrial Development Company, has assisted in the estab. of factories for the production of textiles, glass, shoes, cement, etc. From May 1948 certain estab. industries and new concerns were granted twelve years' exemption from certain taxes, including income tax. San Juan, on the N. coast, is the cap. and chief port; other tns. include Ponce, which has also a good harbour, Mayaguez and Arecibo. There are over 2000 m. of good roads and nearly 400 m. of railways. The is. is subject to hurricanes, one in 1928 causing great damage.

P. R. was discovered by Columbus in 1493, and in 1508 was explored by Ponce de León (q.v.). It remained a Sp. dependency until it was ceded to the U.S.A. in 1898 by treaty after the Sp. Amer. War. The constitution of P. R., as estab. by the 'Jones Act' of 1917, was amended in 1947. There is representative government. The governor, who since 1948 is elected by popular vote every four years, is the executive power; his executive

council comprises seven heads of depts. There is a bicameral legislature. The amendment of 1947 also provided that all heads of the depts. of the Insular Gov. be appointed by the governor; the auditor of P. R. and the justices of the supreme court continued to be appointed by the President of the U.S.A. Eng. is the official language but Sp. is the native tongue. Pop. 2,146,700 (about 750,000 of this total are bilingual). See T. White, *Puerto Rico and its People*, 1938; B. Pagán, *Puerto Rico: the Next State*, 1942; E. S. Garver and E. B. Fincher, *Puerto Rico: Unsolved Problem*, 1945; R. Tugwell, *The Stricken Land*, 1947; also *Puerto Rico Monthly Statistical Reports*, beginning 1943.

Puerto Varas, tn. of Chile, in the prov. of Valdivia, on the edge of Lake Llanquihue, and near the Osorno, Calbuco, and Tronador volcanoes. It is in the Chilean 'Switzerland,' 16 m. from Puerto Monto (q.v.) and 650 m. from Santiago on the S. railway line. P. V. is a noted beauty spot. Pop. 44,000.

Puff-Adder, or *Hitis arietans*, ophidian reptile in the family Viperinae, and sub-family Viperidae. It is a native of Africa and S. Arabia, and is regarded with dread on account of its very poisonous nature. It attains a length of 5 ft., is yellowish-brown in colour, has a depressed head and small eyes. It is nocturnal and carnivorous, and when surprised puffs out the upper part of its body.

Puff-Ball, fungus of the family Lycoperdon (q.v.). P.-Bs. generally grow on the ground, and are roundish, at first firm and fleshy, but becoming powdery inside, the powder consisting of the spores, among which are many fine filaments, loosely filling the peridium. See also BOVISTA; FUNGUS; LYCOPERDON.

Puff-Birds, or Buceroninae, from a sub-family of Galbuidae, family of coraciiform birds. When in repose the birds puff out their plumage, which is dark in colour with patches of white.

Puffin, bird of the family of Alcidae or Auks, sub-order of the Alcae in the order of Charadriiformes. The body is compact and the plumage close; the head is large, with a stout bill, with which the P. catches fish. The Common P. (*Fratercula arctica*) is found on the Brit. coasts, and lays its eggs in any crevice of the rocks or in a burrow which it makes. It is a little larger than a pigeon, and lays only a single egg at a time. The tufted P. (*Lunda curvata*) is another important member of the family. See also under AUK.

Puffin Island, otherwise Priestholm or Ynys Seiriol, lies off the N.E. coast of Anglesey. It is $\frac{1}{2}$ m. long, and is noted as the home of puffins. In the sixth century Seiriol, a hermit, had a cell on the is.

Pugachev, formerly Nikoláevsk, tn. of the R.S.F.S.R., in the region of Saratov, 100 m. S.W. of Samara, on the Irghits. It is the centre of a farming region and trade in cattle and corn is carried on.

Pug-dog (etymology uncertain; possibly from Lat. *pugnus*, fist, or a weakened form

of puck—M.E. *pouke*, goblin), smallest dog of the mastiff family, probably introduced into England from Holland. It became very popular in England during the reign of William of Orange, when it was known as 'Dutch P.' Its popularity died out for a time, but was revived about 1885. It can do with less outdoor exercise than any other variety of dog, but has a greater tendency to put on fat. It is amiable, but indolent. Points: body short, square, and cobby; wide chest; ribs deep and well rounded; legs strong, straight, and well under, of moderate length; feet firm, with well split-up toes, and nails black; head large,



PUG

T. Fall

massive, round; muzzle short, blunt, and square; eyes large, dark, lustrous, and set well apart; mask and ears black, and head heavily wrinkled; markings clearly defined; thumbmark on forehead, and back-trace very black; tail curled slightly over the hip; coat soft, smooth, short, and glossy; colour, apricot or silver-fawn. There is also a black variety.

Pugot Sound, inlet of the Pacific Ocean, in Washington, U.S.A., extending from the E. end of the strait of Fuca, in a direct line for about 80 m. It has an area of about 2000 sq. m. and a number of is., Vashon and Bainbridge being the largest. The two main branches are Admiralty Inlet and Hood Canal. It has a gov. navy yard. The shores are well wooded, and fir is shipped to foreign ports for use in shipbuilding. The sound is also remarkable for its fish.

Pugilism, see BOXING.
Pugin, Augustus Welby Northmore (1812-52), Eng. architect, b. in London and educated at Christ's Hospital. He was the pioneer of the revival of Gothic architecture in the nineteenth century.

His first important work was the designing of the furniture of Windsor Castle, 1827; but he subsequently undertook all sorts of commissions (especially eccles.), and in 1836-43 was employed by Sir Charles Barry in providing the detailed drawings for the Houses of Parliament. P. became a Rom. Catholic, and designed many Rom. Catholic churches, including the cathedral of St. George at Southwark (severely damaged during the Second World War). He pub. *Contrasts; or a Parallel between the Architecture of the 15th and 19th Centuries* in 1836 and *The Principles of Christian Architecture* in 1841. In these books P. set out his idea of the close connection between Christianity and Gothic architecture, and attacked what he held to be the 'pagan' method of architecture of his immediate predecessors and some of his contemporaries. See lives by B. Ferrey, 1861, and H. Strr, 1918, and studies by P. Waterhouse, 1891, and M. Trappes-Lomax, 1932; also D. Gwynn, *Lord Shrewsbury, Pugin, and the Catholic Revival*, 1946.

Puglie, see **APULIA**.

Pulsne Judge (Fr. *puls* and *né*; Lat. *post natus*, after born). The judges of the sev. divs. of the high court of justice, other than the lord chief justice of England and the president of the divorce court, are somewhat inappropriately termed P. Js. to denote their inferiority in rank to the above-mentioned chief judges and the judges of the court of appeal and the House of Lords.

Puket, port on the E. side of Salang (or Junkseylon) is., on the W. of the Malay Peninsula. Its importance is due to its valuable tin-mines. Pop. about 30,000.

Pulcinella, see **PUCCINELLO**.

Pulse, see **FLEAS**.

Pulicat, tn. of Madras prov., India, in the dist. of Chingleput, 25 m. N. of Madras. It was one of the earliest Dutch settlements on the Indian mainland, and dates from 1609. It came into Brit. hands in 1825. Pop. 10,000.

Pulitzer, Joseph (1847-1911), Amer. newspaper owner, b. in Mako, a small Hungarian vil. His father was Jewish, his mother Austrian. He was educated in Budapest. Rejected by the Hungarian Army and the Fr. Foreign Legion, he made his way to the U.S.A., where he served in the civil war. Later he studied law, but did not practise, securing instead a position as reporter on the Ger. paper *Die Westliche Post*. He took a part in the revolt of the Liberal Republicans against the corruption in their party. Having sold some shares in *Die Westliche Post* at a good profit, he went on a visit to Europe. Then, returning to St. Louis, he bought a moribund Ger. paper and sold it at a good profit, and in 1878 he bought the *St. Louis Dispatch*. He and the owner of the *Post* agreed to a merger, and the *Post-Dispatch* became one of the leading papers of the city. By 1880 P. had become its sole owner. In 1883 he bought the *New York Herald* (q.v.), and by 1887 also started evening and Sunday eds. Near Brooklyn Bridge he erected to house his papers one of the first tall office buildings

in New York city. P. brought to New York a different journalism from any it had known up to that time. It revelled in the sensational but also made slashing attacks on the forces of corruption in business and politics. Among P.'s gifts was the endowment of the school of journalism at Columbia Univ. and a fund for the gift of ann. cash prizes for the best newspaper work, drama, and literature in the U.S.A. each year. See life by D. C. Seitz, 1924.

Pulke, see **PUQUE**.

Pullet, see under **POULTRY**.

Pulley, see **BELTS** and **BELTING**.

Pullman, George Mortimer (1831-97), Amer. inventor, b. in Chautauqua co., New York. He invented the Pullman sleeping-car. He built his first car in 1859, and in 1863 the 'Pioneer,' at a cost of \$18,000, the first of the cars to bear his name. He organised the Pullman Palace Car Company, of which he was president, and in 1887 originated the vestibule train. He also founded a model tn. called Pullman near Chicago, which is now absorbed in that city.

Pullman, vil. of Washington, U.S.A., in Whitman co. The state college for science and agriculture is in P. Pop. 4400 in 1910.

Pulmonata, see **GASTEROPODA**.

Pulo Penang, see **PENANG**.

Pulp (paper-making), see under **PAPER**.

Pulpit (Lat. *pulpitum*, that part of the Rom. stage on which the actors recited or performed their parts); in eccles. architecture, the wood or stone erection from which the preacher speaks. Traditionally the P. is on one side of the nave. Pisano's marble P. at Siena is a masterpiece; there are fine wooden Ps. in the Low Countries. Eng. Ps. of the Jacobean period are frequently very finely carved. Sometimes Ps. were built in the open air, e.g. Donatello's P. attached to the outer wall of Prato cathedral. The word also signifies a reading-desk, and this alone is the meaning of the Fr. *pupitre*.

Pulque, or **Pulke**, one of the national intoxicating drinks of the Mexicans, which has never been supplanted since the time of the Aztecs. It is produced by procuring the fermented juice of the *maguey*, the *Agave americana*. See **AGAVE**.

Pulse, periodic change in the shape of an artery due to changes in blood pressure caused by the beating of the heart. When the blood is expelled from the heart at each systole the elastic walls of the aorta are suddenly distended, and this distension is communicated to the other arteries, the movement becoming feebler and feebler as it travels away from the heart. Where an artery approaches very near the surface, the intermittent distension of its walls can be perceived visually, or if it can be compressed against a hard structure the throbbing can be discerned by touch. It is customary to gauge the action of the heart by feeling the throbbing of the radial artery at the wrist, as it can be conveniently compressed against the bone. The P. beat does not take place at the same time as the heart beat, as the wave of distension and relaxa-

tion has to travel from the heart to the wrist, but the general character of the beat is maintained. The distension occurs when the blood is being forced into the arteries; the relaxation occurs as the blood flows out of the arteries into the capillaries. There are also subsidiary beats, of which the most important is caused by the diastolic wave, indicating the back-flow of the blood towards the heart as the out-flow ceases. The frequency of P. beat varies with age, sex, and other conditions. In a new-born babe the rate is 130 to 140 times per min.; in an adult man about 72 per min.; in an adult woman 80 per min. The rate is lower when the subject is sitting, and lower still when lying down. Food, exertion, excitement, and stimulants increase the rate. A strong beat generally indicates vigour, while a feeble P. denotes debility. There are, however, many small indications which convey important information to the practised observer.

Pulse, term for leguminous agric. plants, particularly beans and peas.

Pulsometer, see PUMES.

Pulteney, William, second Earl of Bath (1681-1764), Eng. statesman, *b.* in London. He entered Parliament in the Whig interest in 1705, and was secretary of war from 1714 to 1717. He supported Bolingbroke in 1725, and assisted in forming 'the Patriots,' a party whose object it was to harness the gov. With his allies he eventually succeeded in undermining Walpole's power, and was invited, but declined, to form an administration in 1742, in which year he was created earl of Bath. He was an able, and at times a vitriolic, speaker, but not a sound statesman.

Pultowa, or **Poltava**, see POLTAVA.

Pultusk, *tn.* of Poland, on the Narev. Originally the residence of the bishops of Płotsk, and was the scene of a battle between the Fr. and Russians in 1806. Pop. 20,000.

Pulverised Coal. The object of P. C. is to make a solid fuel as nearly gaseous as possible, gas being regarded as the most perfect fuel state at present known. P. C. is sufficiently fine when 85-95 per cent passes through 200 mesh. This mixture in the presence of adequate air ensures complete combustion. The coal is pulverised by abrasion or chopping machines, crushing rolls, or ball mills. Since P. C. may form an explosive mixture, for safety purposes the quantity of air conveying the fuel to the burners is kept under 30 per cent of the amount necessary for complete combustion. The remaining 70 per cent is introduced at the burner. There are three methods of handling P. C.: (1) the unit system, where it is taken direct from the pulveriser by fan to the burner, (2) the bin storage system, where it is stored in a bin with feeders delivering any required quantity to the burners, (3) the ring-main system, where it circulates through a main pipe provided with a number of valves, each capable of tapping off a supply for use in various furnaces. With P. C. firing, an increased load can be obtained quickly at a reasonable efficiency

and without undue generation of smoke. P. C. is used in metallurgical furnaces, cement-making kilns, and for firing high-pressure water-tube boilers. Until recent years P. C. was considered to have many disadvantages, such as the danger of explosion, slagging, and grit emission from the chimney. All these difficulties have now been overcome in the modern P. C. plant.

Puma (*Felis concolor*), large Amer. carnivore, belonging to the cat family. Unlike its relation, the jaguar, it shows no trace of the feline markings when adult, the upper parts being a uniform yellowish-red, the under surface being a lighter colour. It was this uniformity of colour which led to its being mistaken for a member of the lion family, and the popular name of 'mt. lion' still survives among the Rockies. P. is its Peruvian name, and from the Brazilian comes its other popular name of cougar. The name of panther was given to it by the early settlers. The average length of the body from snout to root of tail is about 3 ft. 6 in., while the tail, which is about the same thickness throughout, measures somewhat over 2 ft. The P. is timid in the presence of men and shows great reluctance to attack them; it is rather inclined to try to make friends. It feeds on deer, sheep, horses, and other animals, and proves very destructive on account of its killing far more than it can eat.

Pumice, light kind of lava (*q.v.*), usually consisting of obsidian made spongy or porous by the escape of steam or gas during the process of cooling. It is used for smoothing or polishing, or for removing stains.

Pump, machine for lifting fluids, forcing them to a higher level, or transferring them from one place to another. The work done by a P. is measured by the weight of fluid lifted and by the total head in ft. (see Fig. 1). The *total head* includes suction head, delivery head, and losses due to the friction of the fluid in the pipes, bends, and valves calculated in ft. head. The *suction head* is due to the air pressure on the surface of the fluid and would raise a column of water 34 ft. in a complete vacuum. A complete vacuum, however, is not attainable, and owing to leaks and pipe friction it is only practical to attain a suction head of 25 ft. The recommended suction head is 20 ft. for reciprocating Ps. and 15 ft. for centrifugal Ps. For hot fluids or fluids such as petrol there should be no suction head, and the P. should be below the level of the fluid, as the vacuum would otherwise cause the fluid to vaporise. Any reduction in air pressure at high altitude would also mean a corresponding reduction in the possible suction head. *Delivery head* is limited only by the design of the P. and the power available to drive it. *Frictional head*, caused by friction in pipes and bends, can be reduced by increasing the size of the pipes, which reduces the velocity of the fluid in the pipe. A normal pipe line is designed to give a loss of 5 ft. head per 100 ft. of pipe.

The prin. types of Ps. are (1) reciprocating Ps.; (2) rotary Ps.; (3) centrifugal Ps. Other means of raising fluids include the hydraulic ram, air-lift Ps., Archimedes' screw (q.v.), chain Ps., etc.

RECIPROCATING PUMPS.—The simplest form of reciprocating P. is the suction P. as illustrated in Fig. 2. The barrel is fitted with a piston worked by a handle pivoted in the P. casing. Valves are provided at A in the piston and at B at the lower end of the barrel, both opening in an upward direction. On the upward stroke of the piston the valve A remains closed and the air in the chamber between the valves becomes attenuated and is therefore at reduced pressure. The atmosphere pressing on the water in which the P. is sunk thus forces the water and air up through valve B into the chamber. On the downstroke of the piston valve B is immediately closed and the compression causes any air in the chamber to escape through valve A. By repeated strokes of the piston all air is thus exhausted and water is forced up to fill the chamber and escape above A with every downstroke, each upstroke lifting this on the closed valve A into the upper part of the P. barrel to flow from the spout.

Diaphragm Pump (Fig. 3).—This is used for draining building foundations and works on the same principle, but is fitted with a flexible diaphragm instead of a piston. The stroke is therefore much shorter, but owing to the area a large quantity of water can be raised to a low head usually not exceeding 10 ft.

Suction Pump.—This is another form used in wells and boreholes where it is usually power driven, the principle being as described above. The piston and valves, however, work in the lower part of the barrel at or near water level, the piston being operated by a crank at the surface through a long rod in the barrel. The part of the barrel above the piston is known as the rising main and the perforated filter at the lower end the strainer or snorer (or windbore). With this type of P. all the work of lifting water is done on the upstroke of the piston, which has to be allowed for by using a balance weight on the driving gear. To overcome this difficulty a double-acting P. is used in which there are two pistons, each containing a valve. Each piston or bucket has its own rod, the rod of the lower piston passing through the upper piston and its rod (see Figs. 4 and 5).

The Plunger Pump.—The principle of this P. is shown in Fig. 6. As the plunger rises the pressure is reduced in the P. chamber, closing valve A and causing valve B to open, allowing the water to enter the chamber under air pressure. On the downward stroke valve B is closed and the water forced through valve A into the delivery pipe. In this type it is usual to fit an air vessel C above the valve A, containing air which acts as a cushion and damps out the impulses of the plunger which would otherwise cause water-hammer in the pipes. A single plunger P. is illustrated but three or more

plungers are used on one P., each plunger having its own suction and delivery valves but having common suction and discharge pipes. This arrangement gives a more even flow.

Horizontal Double-acting Pump.—This is shown in Fig. 7, S being the suction pipe and D the delivery; two sets of suction valves, B and B1, and delivery valves, A and A1, are fitted and operated by the action of the plunger. With the right stroke B1 is closed and water forced through A1, while A is closed and water drawn through B. The left stroke closes A1 and opens B1, while B is closed and water forced through A. This type is commonly used for boiler-feeding work, the plunger being directly operated by a steam piston of rather larger area, so that steam at a pressure of 100 lb. per sq. in. in the boiler can be used to force water into the boiler at about 120 lb. per sq. in., i.e. with and against the pressure in the boiler.

Reciprocating Ps. are generally used for raising comparatively small quantities of fluid to high heads and have the advantage of being self-priming as the piston exhausts the air in the suction pipe. It is usual, however, to fit a foot-valve on the suction pipe to keep it full of water and reduce time lost in exhausting air when starting.

ROTARY PUMPS.—These include a wide variety of designs, the object of which is the elimination of impulses obtained in reciprocating Ps. by providing in effect a piston moving continuously in one direction. No valves are required as the flow is always in one direction, and as the air is exhausted from the suction pipe the atmospheric pressure forces the fluid to the P. in the same manner as in reciprocating Ps. The suction head is usually limited to a few feet, as rotary Ps. rely on fine running clearances instead of the more positive seal obtained with a plunger and valves. Viscous fluids such as thick oils can be handled with many types of rotary Ps. owing to the absence of valves.

Gear Pump.—This (Fig. 8) is one of the most common types and is used on most petrol engines for circulating oil to the bearings. One gear is driven and this drives the other gear in the opposite direction, the oil being carried round by the gear teeth from the suction side to the delivery side of the P. The gears are made to fit closely in the casing, and the gear teeth in contact with each other form a seal which prevents the oil getting back to the suction side. Those Ps. work at pressures up to 80 lb. per sq. in.

Drum Pump.—This pump (Fig. 9) consists of a casing containing two drums coupled by gears situated outside the casing. One drum A has two projections similar to gear teeth in form which mesh with two grooves in the large drum B. During the rotation of the drums the teeth on drum A sweep the fluid through passage C, drum B merely acting as a seal or rotary abutment.

Other types of rotary abutment Ps. have different numbers of teeth or vanes but use the same principle (see Fig. 10).

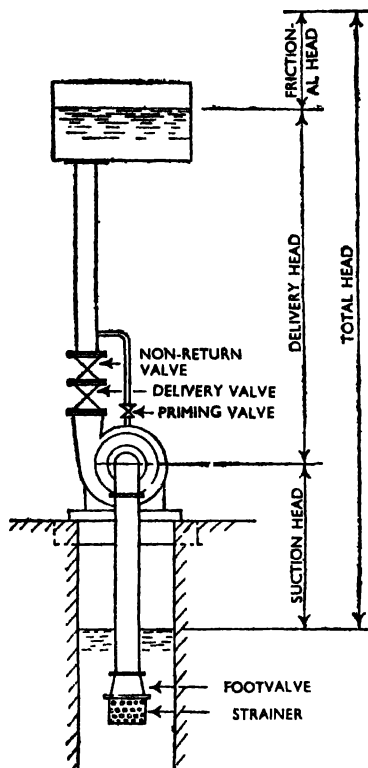


FIG. 1. PRINCIPLE OF PUMP WORKING AND TERMINOLOGY

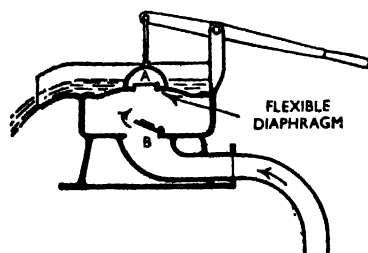


FIG. 3 DIAPHRAGM PUMP

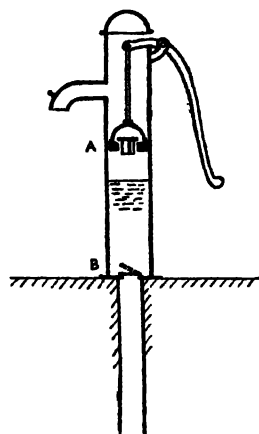
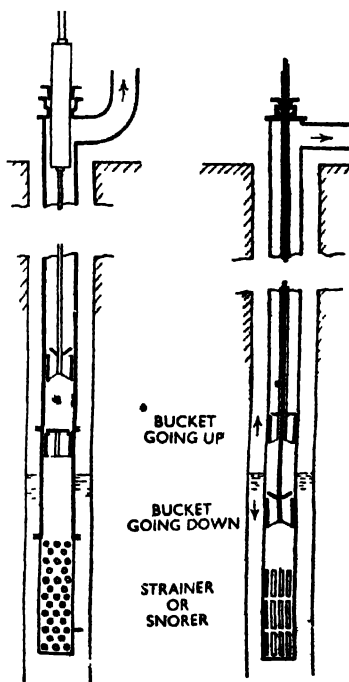


FIG. 2. SUCTION PUMP



SUCTION PUMPS FOR WELLS AND BOREHOLES
FIG. 4. SINGLE-ACTING FIG. 5. DOUBLE-ACTING

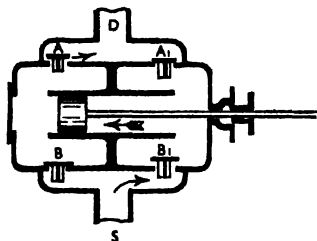
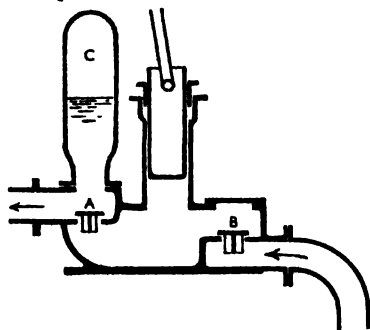


FIG. 7. HORIZONTAL DOUBLE-ACTING PUMP

FIG. 6. (left) PLUNGER PUMP

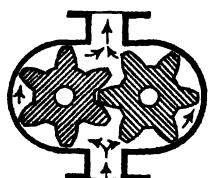


FIG. 8. GEAR PUMP

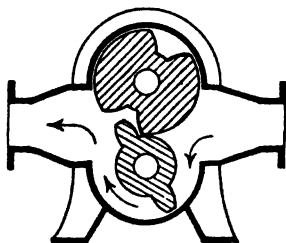


FIG. 9. 'DRUM' PUMP (ROTARY ABUTMENT)

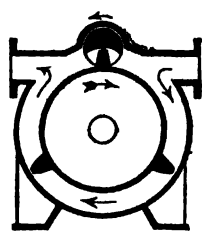


FIG. 10. ROTARY ABUTMENT PUMP (3 TEETH)

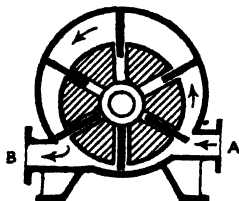


FIG. 11
ROTARY
VANE
PUMP

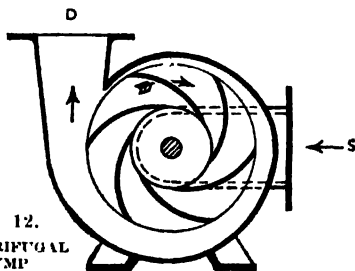


FIG. 12.
CENTRIFUGAL
PUMP

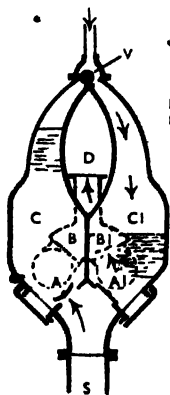


FIG. 14.
PULSOMETER
STEAM PUMP

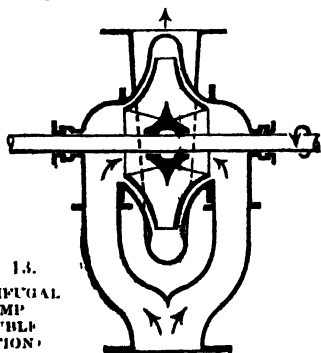


FIG. 13.
CENTRIFUGAL
PUMP
(DOUBLE
SUCTION)

Rotary Vane Pumps (Fig. 11).—These consist of a circular casing containing a drum or rotor mounted eccentrically and fitted with sliding vanes. As the rotor is revolved the spaces between the blades increase and decrease in volume, thus drawing in the fluid through port A and expelling it through port B.

Both reciprocating and rotary P.s. are self-priming, that is, they are capable of exhausting the air in the suction pipe, if in good order, and will therefore start pumping without first filling the suction pipe with fluid.

CENTRIFUGAL PUMPS. These P.s. work on the principle of a fan, having a volute casing in which an impeller (a series of curved vanes) rotates at high speed, the fluid being thrown outwards by centrifugal force and then collected in the volute casing which directs the flow of fluid along the delivery pipe. This type of P. must be primed with fluid before it will start pumping as there are no valves or seals in the P. itself. Once started, the column of fluid passing through the delivery pipe itself acts as a continuously moving piston, causing the atmospheric pressure to force water up the suction pipe as in the case of reciprocating and rotary P.s. It is usual to fit a foot-valve and strainer and a priming cock to enable the P. to be primed before starting. The advantages of the centrifugal P. are smooth flow, the small size of the P. required for output, the high speed of impeller shaft permitting direct drive by electric motor or high-speed engine, and good control of flow. Unlike the positive P.s. a delivery valve can be closed to reduce the starting load on the motor or to control the flow. The power required is in proportion to the weight of water lifted so when the valve is closed the power required is only that necessary to overcome friction losses in the P.

The small sizes of P. (Fig. 12) have the suction pipe entering the centre of the impeller at one side, but as this causes an end thrust on the shaft the larger P.s. are fitted with a double suction which balances the thrust (see Fig. 13).

Turbine or Multi-stage Pumps.—These are similar in principle, but consist of a number of impellers on one shaft, the fluid being guided from the delivery of one impeller to the suction of the next by means of guide vanes and ducts, each impeller building up additional pressure. Turbine P.s. are now built to give pressure of 1250 lb. per sq. in. or over 2900 ft. head. They are also built as borehole P.s. with up to twelve stages of small diameter driven by a shaft through the rising main guided by water-lubricated bearings from a vertical spindle motor.

Submersible Pumping Unit is a type of equipment developed to meet the demand for a self-contained unit simple to install and economical in operation. The unit consists of a single or multistage vertical spindle turbine P. direct-coupled to an electric motor specially designed to work under water and mounted below the P. and strainer, a non-return valve being

fitted above the P. to retain the water in the rising main. The complete unit is bolted direct to the rising main and lowered into the well or borehole until it is below the surface of the water, thereby eliminating suction troubles and the need for priming. This is especially useful when the motor is started automatically by means of a float or pressure switch as the P. is always primed ready for starting. The short direct drive from the motor to the P. eliminates troubles due to alignment of long shafts, as when a borehole P. is driven from the surface, and the need for bearings and supports in the rising main, giving a more efficient unit. Submersible P.s. are available in a wide range of sizes from 5½ in. diameter for use in a 6-in. diameter borehole and capable of delivering 300 to 3000 gallons per hr. to 430 ft. head to P.s. suitable for 14 in. diameter boreholes, capable of delivering up to 100,000 gallons per hr. The special small diameter motors used are of the squirrel-cage type, grease-lubricated, to give 6000 to 10,000 hrs. running before requiring attention.

OTHER TYPES OF PUMPS.—Pulsometer Steam Pump (Fig. 14). This P. is in a class by itself, using steam pressure directly on the surface of the water for forcing water up the rising main and using the vacuum created by condensation for filling the suction pipe with water. There are two P. chambers which work alternately, being supplied by steam through a ball valve V which oscillates between the two chambers. As steam enters chamber C the suction valve A is closed and the water driven through discharge valve B until the water level in C reaches the level of the discharge chamber. Here, owing to the rapid increase in surface area, condensation of the steam takes place, causing valve V to be drawn over, closing the steam port in C, further condensation causing C to refill with water through valve V. The process is then repeated in chamber C'. This P. is used mainly by contractors for emergency work, as it requires no foundations and can be slung on a chain or rope. Steam can be supplied through a flexible pipe.

Air-lift Pump (Fig. 15).—This is used in boreholes and has the advantage that no moving parts are in contact with the water. A pipe supplying compressed air is taken to the lower end of the rising main and air is forced into the water through a series of small holes. The air mixing with the water in the pipe lessens its sp. gr. so that the weight of water outside the pipe forces up the mixture of water and air inside.

The Hydraulic Ram (Fig. 16) uses the force of a large flow of water to raise a small quantity to a high level. Water from a dam is led through a straight drive pipe to the ram, and flows through valve A until the velocity causes the valve to close. This stops the flow, causing a sudden rise in pressure which forces open valve B to the delivery pipe. After this energy is spent, valve A opens again by its own weight and the cycle is repeated.

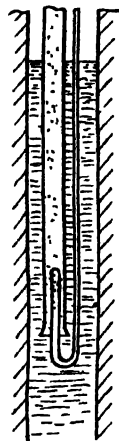
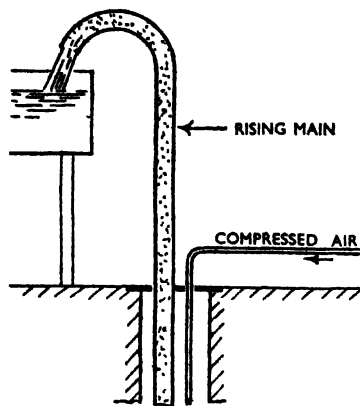


FIG. 15. AIR-LIFT PUMP

An air vessel C is fitted above valve B to even out the flow and reduce damage to the pipes due to water-hammer. Rams are also made which will raise a supply of clean water from a well, using riv. water as the source of power operating a spring-loaded plunger which pumps the clean water. See N. Swindin, *Modern Theory and Practice of Pumping*, 1924, and A. Allcott, *Pumps*, 1938.

Pumpnickel, bread made from coarsely ground unbolted rye. It is especially associated with Westphalia.

Pumpkin (*Cucurbita Pepo*), half-hardy plant of the family Cucurbitaceae, with large solitary yellow flowers and rough leaves which are sometimes eaten instead of spinach. The gourd-like fruit is used either as a vegetable, like vegetable marrow, or as a fruit in tarts, etc.

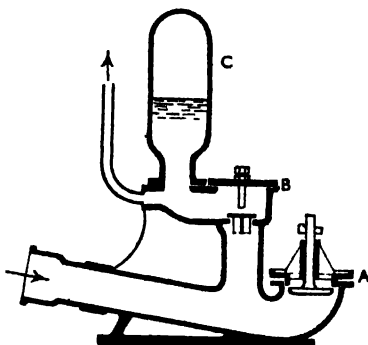


FIG. 16. HYDRAULIC RAM

Pun. Addison defined a P. as 'a conceit arising from the use of two words that agree in sound but not in sense.' This definition occurs in the sixty-first number of the *Spectator* in an article in which Addison sketches the hist. of P. from the time of Aristotle. Ps., of course, cannot be trans. Punning was much in vogue in England in the sixteenth, seventeenth, and eighteenth centuries, but it has now dropped into disrepute in literary circles. It survives, however, in the U.S.A., and in the Eng. Christmas pantomime; while radio variety shows of the calibre of 'Itma' have raised its prestige somewhat in twentieth-century England. Though somewhat puerile, like the anagram and the acrostic, it has in former days been employed by writers and orators of repute, notably by Lamb and Cicero. Shakespeare used the P. a great deal, and with a high degree of skill. In his day the P. was an acknowledged literary device, and was not necessarily intended to be humorous; thus Shakespeare puts a P. into the mouth of Lady Macbeth during the most tragic moment of the play, to heighten the horror. Speaking of the murdered Duncan, she says: 'If he do bleed, I'll gild the faces of the grooms withal, For 't must seem their guilt.'

Puna, see POONA.

Punans, survivors of the Caucasoid-Mongoloid tribes of S.E. Asia (preceding the separation of Borneo, Sumatra, and Java from the mainland). They are a primitive nomad hunting tribe of Borneo living in the remote jungle and are physically akin to the Kenyahs and Klemmentans. They live in small, much scattered groups and remain hidden in the depths of forest and jungle. Like the Kenyahs of the north-central highlands they are short of stature with a comparatively long body and are very sturdily built; the head is comparatively short (sub-brachycephalic) and inclined to be square; the most distinctive characteristic is a well-developed nasal bridge, with nostrils shot far forward and upward; their skin is of a fine silky texture and either pale fawn or even

of a greenish hue. A Punan community generally acknowledges a titular chief, whose authority depends on his age and reputation and is not formally defined. Monogamy prevails, though occasionally polyandry occurs. Endogamy within the group is not countenanced. Their God is Bali Penyalong, made in the image of a crocodile carried round by a Punan group wherever it goes. Burial and funeral rites are unknown and the Punan idea of the after-life seems to be devoid of any doctrine of retribution as well as of any other moral significance. P. are great believers in charms and sorcery and their medicine men are noted for their knowledge and skill. The chief art of the P. is that of the hunter and in tracking and trapping. The P. understand the Kayan dialect but a simplified form of the Malay language has long been established. See C. Hose, *The Payan Tribes of Borneo*, 1912, and *Natural Man: a Record from Borneo*, 1926.

Punch, alcoholic beverage. The name is derived from *punch*, Hindi for five, the original drink containing five ingredients, including tea and arrack. P. is now composed of spirits, spice, sugar, fruit-juice, and water.

Punch and Judy, the most famous and popular Eng. show for hand puppets. Punch, an abbreviation of Punchinello (q.v.), was brought to England about 1660 by travelling It. showmen. Judy, or Joan, is said to have derived from Mrs. Noah in the old deluge play; she appeared as Mr. Punch's shrewish wife after 1688. The story is attributed to Silvio Fiorillo, a seventeenth-century It. comedian, and in Eng. marionette theatre was gradually adapted to popular tastes until an epic poem of Punch emerged, with traditional scenes in which the merry, shameless, shrill-voiced fellow beats his wife and baby, defies morality and religion, and outwits the Devil. See J. P. Collier, *Punch and Judy*, 1870; D. Calthrop, *Punch and Judy, a Corner in the History of Entertainment*, 1925; and C. H. Grandgent, *The Tragic Comedy or Comical Tragedy of Punch and Judy*, 1928.

'Punch, or The London Charivari' (from Punchinello, the chief character in a well-known puppet show of It. origin). Brit. illustrated weekly jour. It first appeared on July 17, 1841, but it was not until Bradbury and Evans became the proprietors in the following year that the paper was put on a sound footing. Mark Lemon was the editor from its foundation until 1870, and he was in turn succeeded by Shirley Brooks, Tom Taylor, Sir Francis Burnand, Sir Owen Seaman, E. V. Knox ('Evoe'), and ('K. Bird' ('Kougasse')), who became editor in 1948. P. contains much satirical humour, both pictorial and written, and is noted for the high standard of its dramatic and literary criticism. Douglas Jerrold and Thackeray were the two giants on the literary side in the paper's early days. P. has always been fortunate in securing the best black-and-white artists of the day; the list includes Leech, Doyle, Tenniel, Charles Keene, Du Maurier, Harry Furness, Lin-

ley Sambourne, Phil May, E. T. Reed, Bernard Partridge, Ernest Shepard, and Leonard Raven-Hill. See M. H. Spielmann, *History of Punch*, 1895.

Puncheonstone, racecourse in co. Kildare, Eire, near Naas, famous for its steeple-chases.

Punchinello (**Puleinella**), traditional figure of the Commedia dell'Arte (q.v.) and ancestor of Punch, having something in common with Harlequin (Arlecchino). He wears a black mask, and a large nose, is a rogue and braggart, with a rough country wit. Punch of the Punch and Judy (q.v.) show derives his name from the same source.

Punctuation is the insertion in written matter of stops and other points to facilitate quick and accurate reading. Stops correspond to the necessary pauses and inflections in speech. P. was invented by the Gks., but present symbols are derived from the Venetian printer Manutius (1450-1515). The stops proper, in descending order, are full stop, colon, semicolon, and comma. Other points used are the question and exclamation marks, hyphen, dash, brackets ('parentheses'), apostrophe, and quotation marks. Of these latter, many are comparatively recent additions.

The full stop, followed by a space and initial capital, marks the end of a period (sentence); it is replaced when requisite by a question or exclamation mark. The colon, formerly used to mark the main div. in an elaborate period, is now used almost exclusively to signify that there is something to follow, e.g. *There are four elements: earth, air, fire, and water*. It may be followed by a dash when it introduces a fresh paragraph. Commas mark the minor divs. of a sentence, or separate the items of such a series as *earth, air, fire and water* (enumeration). The most frequent uses of the comma are in enumeration and in the following two ways: *The ship will sail to-morrow, but we go aboard to-day* (co-ordinate sentences which are joined by a conjunction); *The earth, as we all know, revolves round the sun* (parenthetical). In such a sentence as the ship example, a semicolon is indicated if such closely associated sentences are not joined by a conjunction: *The ship will sail to-morrow; we go aboard to-day*. Brackets ('parentheses') separate extraneous matter. The primary use of the dash is to mark an abrupt pause or change of construction: *All about—what do you think?* It is often used in lieu of brackets, and less properly as a maid-of-all-work in lieu of commas, semicolons, and colons. It is an awkward and ugly stop, which should not be used unnecessarily. The question mark is used after a sentence in question form or spoken interrogatively: *You will come?* The exclamation mark follows an exclamation, or an emphatic prayer or command. If used after an affirmative sentence, it expresses dissent or contempt: *She expected her house to be built in a week!* The hyphen, when used to mark an unfinished word at the end of a line, is a very ancient device. It is now also used

extensively to unite two or more words thus: *red-hot, self-esteem*. By a curious convention, it may not be used between adjective and noun, even when the compound has a special sense, e.g. *cast iron, square leg*; except when the compound is used adjectivally, e.g. *cast-iron pipes*. Nor may it be used between a recognisable adverb and adjective; write *a highly respected man*; *a much esteemed man*. The apostrophe formerly marked an elision, e.g. *belov'd*. Now its chief use is to mark the possessive case, thus: *Men's clothes, St. Thomas's Hospital*. With plurals ending in *s*, the apostrophe follows the *s*, e.g. *old wives' tales*. Quotation marks, commonly called inverted commas, are in fact literally inverted commas followed by apostrophes. They signify that the words enclosed are those actually used, e.g. *'I am down in the dumps'*, *she said*; *She was 'down in the dumps'*, *she said*. By a natural extension quotation marks are also freely used in handwriting and typescript to signify that a word or phrase is the name or title of a book, ship, inn, etc., a foreign term, or used in a technical or slangy sense. They should never be used in this fashion needlessly, as they are ugly and distracting, especially in print. Contractions are usually indicated by adding a point when the word is unfinished an apostrophe when the elision is in the middle of a word: *York's, won't*. See R. A. Skelton, *Modern English Punctuation* (2nd ed.), 1949.

Pundit (Hind. *pandit*, learned man), teacher in India, especially a Brahman versed in the Sanskrit lore and language, and in the science, laws, and religion of the Hindus. Native Ps. have done much as geographical explorers and surveyors in Tibet and other parts. Chief among these may be mentioned Nain Singh, Chandra Das, and A. Krishna.

Pungwe, Pungue, or Arwangwa, riv. of Portuguese E. Africa, flowing E. from the Manica tableland, then S.E. to the Indian Ocean, discharging N. of the Bosi estuary. Fontesville is at the head of navigation.

Punio Wars, see CARTHAGE and HANNIBAL.

Punishment. The term P. is commonly differentiated from those sanctions whereby the wrongdoer is made to compensate the injured party by payment of damages or otherwise, by including in the connotation of the term only sanctions in the shape of suffering experienced by the wrongdoer which are imposed for the public benefit. The scale of Ps. in Eng. criminal law is for the most part prescribed by statute; but judges, though restricted as to maximum, may award as little P. as they deem fit. The existing forms of P. are death (see CAPITAL PUNISHMENT), imprisonment (see PRISONS), and fine (q.v.). Lesser forms of P. are subjection to supervision under a probation officer, binding over to keep the peace (see RECOGNISANCES), and in the case of youthful offenders detention in approved schools, though no treatment ordered by a summary court in the case of children or young persons under seventeen counts as a

conviction (see also BORSTAL SYSTEM and CHILDREN ACTS). As to preventive detentions see under PREVENTION OF CRIME ACTS. See also CRIMINAL LAW, PENAL STATUTES.

Punishment in the Royal Navy is awarded under the powers conferred by the Navy Discipline Acts, 1884 and 1886, amended by King's Regulations. The Articles of War specify the various offences both against naval discipline not punishable under ordinary law, and civil offences which are also punishable by naval courts-martial. For serious offences courts-martial are ordered, but captains of ships of and above the rank of commander are empowered to award summary P. up to three months' detention or imprisonment and dismissal from the service with or without disgrace, which latter involves forfeiture of all medals, pay, and pensions, together with inability to serve under the goy. in any capacity. Lesser summary Ps. include deserting, stoppage of leave and pay, extra work, etc., and may be awarded by more junior officers. P. by courts-martial may involve death, long terms of imprisonment, and dismissal from the service, in addition to disrating or loss of seniority (in the case of an officer). Officer offenders are always tried by court-martial, but during wartime disciplinary courts may be convened to deal with junior officers.

Punishment in the Army is authorised by the Army and Air Force (Annual) Act, 1939 (q.v.). Section 44 of the Act specifies the Ps. for the offences listed in Sects. 4-10, i.e. against military discipline, and in Sect. 41, i.e. against civil law or the ordinary law of the land. Ps. can be awarded by courts-martial (q.v.) or by certain authorities having power to deal summarily with less serious offences. Officers and warrant officers are normally tried by courts-martial. However, for the less serious offences certain specified general officers and brigadiers are empowered summarily to try officers below the rank of lieutenant-colonel, and warrant officers. In each case they can, should they think it advisable, remand the case for trial by court-martial, or award Ps. as follows: forfeiture of seniority or of seniority counting for promotion, and a severe reprimand or reprimand, or both (officers); and forfeiture of seniority of rank or severe reprimand, or both, or reprimand or deduction of ordinary pay, or both, as authorised by the Army Act (warrant officers). In the case of other ranks below the rank of warrant officer, serious offences are tried by court-martial. A commanding officer can deal with specified minor offences by summary trial. He can remand for trial by court-martial any case which he considers to be too serious for his powers, or he can award (a) detention for not more than twenty-eight days; (b) for drunkenness only, a fine not exceeding £2; (c) any deduction of ordinary pay as is authorised by the Army Act; (d) to a soldier (not N.C.O.) on active service, field P. not exceeding twenty-eight days; (e) forfeiture of all ordinary pay for a period not exceeding twenty-

eight days (active service only); and (f) minor P.s. unless detention exceeding seven days has been awarded for the offence.

There is the right to trial by court-martial in all cases where the P. (in the case of officers and warrant officers) is other than a reprimand or severe reprimand; and in the case of all other ranks other than warrant officers is other than one of the minor P.s. specified; then the officer summarily disposing of the case will before awarding P. offer the accused the choice of trial by court-martial. P.s. which courts-martial can award to officers are death, penal servitude (for not less than three years), imprisonment (for not more than two years), cashiering, dismissal from his majesty's service, forfeiture of seniority, severe reprimand or reprimand, stoppages. For other ranks the P.s. are death, penal servitude (for not less than three years), imprisonment (for not more than two years), detention (for not more than two years), discharge with ignominy, reduction to lower grade or forfeiture of seniority (for N.C.O.s only), severe reprimand or reprimand (for N.C.O.s only), forfeitures, fines, and stoppages.

Punishment in the Royal Air Force is regulated by the Air Force Act and King's Regulations and Air Council Instructions for the Royal Air Force. The Air Force Act, like the Army Act, has no continuous operative force but is brought into operation with such amendments as may be necessary from year to year. The Act makes provisions for the pub. of Rules of Procedure and these regulate the procedure of courts-martial, and deal with various other matters, including the confirming and reviewing of sentences. The Air Force Act (Sects. 4-40) specifies various offences against service discipline which are not punishable by the civil or ordinary law of the land, and in Sec. 41 makes additional provision also for the P. of offences which are punishable by the ordinary law. The P.s. possible for offences under the Air Force Act are laid down in the following scale, namely: for officers death (reserved for offences in relation to the enemy such as treachery), imprisonment, cashiering, dismissal, forfeiture of seniority, severe reprimand, reprimand, and stoppages of pay; and for airmen death (limited as above), imprisonment, detention, discharge with ignominy, severe reprimand or reprimand (for N.C.O.s only), and stoppages of pay. Serious offences are normally dealt with by either a general or a dist. court-martial. An officer or warrant officer may be tried only by a general court-martial, but airmen may be tried either by a general court-martial or a dist. court-martial. A dist. court-martial cannot award the death penalty. In addition when an offence is committed on active service trial may take place by a field general court-martial, which is a more summary method of disposal; a field general court-martial can award the same P.s. as a general court-martial. In dealing with offences under Sect. 41 of the Air

Force Act, i.e. offences against the ordinary law, a court-martial may award the same P.s. as are provided for by the ordinary law. In addition to the above King's Regulations and Air Council Instructions for the Royal Air Force make provision for the summary disposal by commanding officers of offences which are not of a serious nature. The P. in such cases may take the form of field P. (on active-service only), detention, confinement to camp, severe reprimand or reprimand (N.C.O.s only), stoppages of pay, and extra duties.

Punjab (from two Persian words meaning 'five rivers'), region of the Indian subcontinent, watered by the Indus and its four great affluents, the Jhelum, Chenab, Ravi, and Sutlej. It is bounded on the W. by the N.W. frontier provs., on the N. by Kashmir, on the E. by the United Provs., and on the S. by Suid and Bayawalpur. The physical character of the N. contrasts strikingly with that of the S. dists. In the N. the whole surface is traversed by spurs from the Himalayas, which enclose deep valleys. In the S. the surface is unbroken by any important eminence, with the exception of the Salt range, about 2000 ft. high, between the Indus and the Jhelum. The climate in the plains is most oppressively hot and dry in summer, but cool and sometimes frosty in winter. Little rain falls except in the dists. along the base of the Himalayas. This caused the Brit. administration to utilise the rivs. for irrigation purposes. A network of canals was constructed; these canals included the Bari Doab, Chenab, Sirhind, Jhelum, and W. Juma. In 1916 over 15,000,000 ac. of land in P. were irrigated in this way. The chief crops are wheat, indigo, sugar, cotton, tobacco, opium, buck-wheat, rice, barley, millet, and maize. Cattle are reared, and dairying and wool and hide industries are carried on. Over a quarter of the tilled area is devoted to wheat cultivation; both this and barley are winter rain crops, reaped in March and April. Sheep are reared for their wool. There are rich deposits of rock-salt, and oil is formed in the Attock region. Cotton-weaving is the chief industry. The manufacturing industries are largely centred in the large towns, Amritsar, Lahore, Multan, etc., and have become important since the beginning of the twentieth century. Blankets, woollen rugs, and carpets are made, and there are large silkweaving and metal-working industries. In 1862 the first railway in the P. was opened; Karachi, Lahore, and Delhi are connected by the trunkline which crosses the P. In 1946 there were nearly 6000 m. of metalled roads. Lahore, Amritsar, Ambala, Rawalpindi, Simla, and Multan are the chief towns. The main languages groups speak Punjabi, W. Punjabi, and W. Hindi. (see further under INDIA, Language, and INDO-EUROPEAN LANGUAGES). There are three main religious divs.—Hindu, Sikh, and Muslim. At the 1941 census the Hindu community numbered 7,530,400, the

Sikh 3,767,400, and the Muslim 16,217,200. There were 505,000 Christians. Area 98,144 sq. m. Pop. 29,309,800.

History.—The early hist. of the P. is that of a region which by situation became the battleground and melting pot of a succession of invading races. Alexander the Great invaded the P., and reached the R. Beas (Hyphasis). He turned back in 326 B.C., and died in 323. Gk. rule ended at his death. From the third century B.C. until the tenth A.D. the P. was subjected to a series of foreign invasions and was split into a number of weak and petty states. It was thus easy for the Turkish aggressors of the tenth and eleventh centuries to conquer the region and wipe out Buddhism. Delhi became the cap. of a Turkish or Afghan sultanate; but the country had little peace. There were intermittent Mongol attacks: Jenghiz Khan (q.r.) devastated the P. in 1221. In 1398 Tamerlane proclaimed himself emperor of India after sweeping across the P. From 1556 to 1707 the P. was ruled by a succession of Mogul emperors, the first of whom, Akhar, was the greatest. Lahore was estab. as the cap. After 1707 the P. was annexed by the Mahrattas, who, in turn, were defeated by a Muslim coalition. In 1799 Ranjit Singh (1780-1839) laid the foundations of a Sikh kingdom in the P. (see further under SIKHS) and by 1820 he had consolidated the P., from the Sutlej to the Indus, under his rule. Relations between the P. and Britain were, however, already strained before Ranjit Singh's death. After it war soon broke out. Two wars were fought, in 1845 and 1848-49. After Gough's victory at Gujrat (1849) the P. was annexed. It was at first governed rigorously but fairly by a Board of Three, but by 1853 the P. was administered by a chief commissioner who in 1859 was made lieutenant-governor. It was under Dalhousie's Indian administration that the P. was given a network of military roads, of the greatest value to the people. The P. became of the first importance in the Indian mutiny, the viceroy being able to do little from Calcutta. If Brit. rule there had collapsed, as it had in the N.W. provs., probably the whole of N. India would have been overwhelmed. Fortunately the new prov. supported the Brit., and the fact that the initiative in the rebellion came from the Bengal army seems to have been decisive with the Sikhs. Between 1896 and 1910 the P. suffered serious mortality from the plague. The effects of the plague were, however, far-reaching. It raised the standard of living and wages among the poorer, temporarily relieved the pressure on land, and checked the movement of the tns., which might have been expected as a corollary to the introduction of W. industry and ideas. Disturbances occurred during the unrest in India at the time of the Minto reforms, but it is not evident that they were motivated by political considerations in the P. Probably they originated in agrarian grievances. Serious semi-revolutionary disturbances occurred in the P. (as well as

in other provs.) in 1919 following the deportation of two Nationalist leaders (see further under AMRITSAR). In the same year the P. was made a governorship. The following ten years saw a great advance in the estab. of educational institutions. The univ. at Lahore was extended and elementary and secondary education was also made available to larger numbers.

The P. made considerable progress under prov. autonomy, which was introduced in 1937, owing largely to the efforts of the Unionist Party of Sir Fazl-i-Husain, who was a far-sighted political leader of the P. These efforts included extension of education, road construction, expansion of public health facilities, hospitals, encouragement of industry, and improvement of agriculture. But the outstanding feature of P. hist. under prov. autonomy to 1945-46 was its possession of a stable ministry with a declared policy of equal opportunity for all, without domination by any class or community.

After the Independence of India Act was passed and the boundaries decided, there followed reciprocal massacres. The seeds of trouble were sown in March 1940, when the Muslim League in a meeting at Lahore adopted 'Pakistan' as their battle-cry and target. This was a new idea to the Muslim peasants of the prov. and caught on rapidly. By the end of 1946 the fear of Hindu domination had become a dominating influence. This fear was accentuated by the stories of Muslims murdered in Bihar. The fear of Hindu domination was easy to arouse because in the W. Punjab the peasant was predominantly Muslim, while the trader and moneylender were largely Hindu and Sikh. Thus, when early in March 1947 trouble broke out in Lahore, Amritsar, and Multan, the peasant Muslims of the N. looted the shops and butchered their owners. Had Hindu and Muslim alone been concerned the partition of the P. might have been effected without serious bloodshed. But many of the victims were Sikhs, and the Sikhs were as resolved to prevent the domination of the Muslim as the Muslims were the domination of the Hindu. Though only 4,000,000 in a total of 29,000,000 the Sikhs were a formidable community, noted for their martial traditions. The settlement cut their small community in two for at midnight on Aug. 14 over 1,500,000 Muslims found themselves suddenly cut off from the rest of their community. Before partition of India came into force on Aug. 14, riots in such cities as Peshawar, Rawalpindi, and Lahore since Feb. 1947 had already induced some 500,000 Hindus and Sikhs to migrate to E. Punjab. After Aug. 14 another 1,500,000 Hindus and Sikhs crossed the border E., and another 500,000 were on the move. In the reverse direction the Muslim minority in E. Punjab, generally poorer and more disorganised than its Hindu and Sikh counterpart, was moving out of the dists. adjacent to the border. More than 1,000,000 people are known to have crossed previously into W. P. and

another 1,000,000 were on the move. Yet another 2,600,000 were at that time too far from the border to be able to move; these were partly in camps whence they would have to move sooner or later and partly living crowded together for self-protection in vills. and townships. Thousands of men, women, and children died on both sides during the consequent cross-migrations. As a result of partition the W. P., comprising 62,100 sq. m. and a pop. estimated at 16,870,000, went to Pakistan; the E. P., 35,684 sq. m. and a pop. of 11,628,900, went to India. See PUNJAB, EAST, and PUNJAB, WEST, for the P. after partition. See also under INDIA; PAKISTAN.

See Sir J. Dowie, *The Punjab, North-west Frontier Province, and Kashmir*, 1916; H. K. Trevasakis, *The Land of the Five Rivers*, 1928; F. L. Brayne, *The Remaking of Village India*, 1929; T. W. Paustian, *Canal Irrigation in the Punjab*, 1930; M. L. Darling, *Wisdom and Waste in the Punjab Village*, 1934; H. Calvert, *Wealth and Welfare of the Punjab*, 1936; A. Ullay, *The Co-operative Movement in the Punjab*, 1937; and T. Singh, *Sikhism: its Ideals and Institutions*, 1938.

Punjab, East, prov. of the dominion of India. As a result of the Indian Independence Act, 1947, the prov. of the P. was partitioned between India and Pakistan, India receiving the E. part, which became known as E. P. The boundary was drawn from Kashmir along the course of the Ravi. E. of Lahore along the Sutlej to the borders of Sind, N.E. of Bahawalpur. E. P. is divided into 124 municipalities. Simla is the cap. Other tns. are Ambala, Amritsar, Jalandhar, and Patiala. Wheat, cotton, sugar, and barley are the chief crops. There are manufs. in the tns., especially in Amritsar, which possesses large textile industries. Area 35,684 sq. m. Pop., estimated at partition, 11,517,900. (For E. P. before 1947, see under PUNJAB.)

Punjab, West, prov. of the dominion of Pakistan. Under the Indian Independence Act, 1947, the P. was divided between India and Pakistan. W. P. contains the dists. of the Lahore, Rawalpindi, and Multan divs. of the former P. prov. Lahore is the cap. and contains a univ. Multan and Rawalpindi are the other large tns. Agriculture is the most important industry: cotton, rice, sugarcane, and wheat are the chief crops. There are numerous manufs. in the large tns. Cotton spinning and pressing factories make up the majority of the seasonal factories. There is also a flourishing textile industry. Area 62,100 sq. m. Pop., estimated at the partition, 16,870,000. (For W. P. before 1947, see under PUNJAB.)

Punkah, or **Punka** (Hind. *pankhā*, fan), large machine for ventilating apartments, used in India and tropical climates. It is generally a movable fan-like frame of wood covered with canvas or calico and hung from the ceiling. A servant outside the room keeps the fan in motion by pulling a cord passing over a pulley through the wall.

Puno: 1. Dept. of S.E. Peru, bordering on Bolivia, almost enclosed by ranges of the Andes. It was formerly a silver-mining area; stock-raising and mining are now the chief occupations. Area 26,133 sq. m. Pop. about 730,300. 2. Cap. of above, on the bay of Puno and the W. shore of Lake Titicaca, 110 m. from Arequipa. Alpaca wool is exported and some silver mines are still worked. Pop. 16,000.

Punt, flat-bottomed shallow boat, broad and square at both ends, and propelled by a pole. It has no stem, keel, or sternpost, and the width at each end is at least one-half of the width at the widest part. Subject to these conditions a P. may be any length or width.

Punta Arenas, Chile, see MAGELLANES. **Punta Arenas**, or **Puntarenas**: 1. Prov. of Costa Rica, Central America, extending along the S.E. coast. Pop. 53,000. 2. Cap. of the prov. of the same name, on the E. coast of the gulf of Nicoya. There is trade in rubber and coffee. Pop. 3500.

Pupil. The circular central aperture in the iris curtain immediately in front of the crystalline lens of the eye, through which light may pass and be focused in the retina. Under the influence of intense light and when viewing near objects the P. contracts, but poor light or the viewing of distant objects generally causes it to dilate. This contraction and dilatation may also be caused by the action of various drugs. For instance, opium causes it to contract, while belladonna and cocaine cause it to dilate. This action affords a method of detecting medically whether a person is addicted to this habit. The P., in cases of nerve degeneration, sometimes fails to react to the influence of light.

Pupillus, **Orbilius** (113-c. 23 B.C.), Rom. grammarian and schoolmaster, b. at Beneventum. He opened a school at Rome in 63 B.C., and among his pupils was Horace, who gives him a reputation for flogging. He wrote a work referred to by Suetonius as *Periagogos*.

Pupin, **Michael Idvorsky** (1858-1935), Amer. physicist and inventor, b. in Idvor, Serbia. He studied physics and mathematics at Cambridge Univ. and under van Helmholtz, at Berlin Univ. He was prof. of electromechanics at Columbia from 1901-31, and became known as the inventor of telephonic devices and for his discoveries concerning X-rays. His best-known work is his autobiography *From Immigrant to Inventor* (1923), awarded the Pulitzer prize for 1924.

Puppets, figures used in dramatic presentation, made to move by various methods, usually jointed, covering the following types: *Marionettes*, jointed P. operated by wires or strings from above; *rod P.*, jointed, operated by rods from below; *glove P.*, manipulated by the hand; *flat P.*, unjointed, used in model theatre shows and 'juvenile drama'; *shadow P.*, flat, jointed figures, whose shadows are cast on a screen; these are sometimes transparent, and are worked by rods. The origin of P. is uncertain, but there is proof of their existence in Greece and

Egypt earlier than in India, where, according to tradition, the god Siva fell in love with a puppet. Many small painted figures with movable limbs, used in religious rites, were found in tombs at Thebes and Memphis. Marionette theatres flourished in all the large tns. of auct. Greece, and this art was undoubtedly borrowed by the Romans, and carried through central Asia to the Orient. Shadow P. in China (140-86 B.C.) developed from bone or horn images used in magical celebrations. This high form of artistic representation, with its bizarre figures and grotesque humour, reached its peak in Java, where P. representing auct. heroes and ancestors resemble fantastic ornaments. Oriental puppet-shows were originally religious; comic figures were introduced for light relief, and gradually became increasingly important.

European P. derived from painted images and mechanical statuettes used in religious festivals. Marionettes were introduced to Europe by travelling It. showmen, and each country gradually adapted It. conventions, devices, and dialogues to national tastes and folklore. It. showmen estab. a permanent theatre in London in 1573, and Capt. Pod was the first Eng. showman (1599). In France the first reliable records of P. are of those shown by Broché in the second half of the seventeenth century, although they must have existed in France, Germany, and other European countries long before then. String marionettes predominated in the sixteenth century, but in the seventeenth hand P. took precedence, and typical figures such as Polichinelle, Punch, Hanswurst, and Guignol appeared. The puppet theatre played a considerable role in all civilised European countries, and was attacked incessantly by the regular theatre and the Church. In the eighteenth century Punch was included in most of the dramas shown by Robert Powell, a famous showman whose booth was opposite St. Paul's. In Italy, where marionette theatres had long held the same prestige as other theatres, *fantoccini* were used for the performance of long plays, ballets, and grand opera. The art declined gradually, but was revived at the beginning of this century by artists who realised its importance as a dramatic medium, and as an educational development. See C. Magnin, *Histoire des marionnettes en Europe*, 1852, 1862; Helen H. Joseph, *A Book of Marionettes*, 1922; M. von Boehn, *Dolls and Puppets*, 1932; J. Russell, *The Puppet Theatre*, 1946; and M. Batchelder, *The Puppet Handbook*, 1947.

Purāna (Sanskrit *purāṇa*, old), name of each of a class of sacred Hindu poetical works in the Sanskrit language, treating of the creation, destruction, and renovation of worlds, the genealogy of gods and heroes, the reigns of the Manus, and achievements of their descendants. Like the Pantras, they are the chief foundation of the popular creed of the Brahminical Hindus. There are eighteen chief P., and eighteen supplementary 'Upa Purāṇas.' They are supposed to have been compiled by

Vyāsa, and were probably admitted to the sacred literature of Hinduism in the sixth or eighth century A.D. See H. H. Wilson (trans.), preface to his *Viṣṇu Purāṇa*, 1840; E. Burnouf and E. L. Havvetto-Besnault (ed. and trans.), *Bhāgavata Purāṇa*, 1840-84; F. Neve, *Les Pourānas*, 1852; J. Muir, *Sanskrit Texts*, 1868-71; A. B. Keith, *Sanskrit Classical Literature*, 1923, and *History of Sanskrit Literature*, 1928.

Purbeck Beds, in geology, marls, fresh-water limestones, and shales, with estuarine and marine beds, containing fossils such as *Cypripis Purbeckensis*, *Paludina*, and *Ostrea distorta*, which form the top beds of the Upper Jurassic system. They attain a thickness of about 400 ft. near Swanage, and are remarkable for their 'dirt beds' and they also afford the ornamental 'Purbeck marble.'

Purbeck, Isle of, peninsular dist. of S.E. Dorsetshire, England, between Poole Harbour and the Eng. Channel, terminating in St. Alban's Head. Purbeck Hills (chalk) traverse it from E. to W. P. was once a deer forest, but the scenery is now mainly heathland and downs. Corfe Castle is in the centre. Marble, limestone, pipe-clay, and potter's clay are found. See Ida Woodward and J. W. G. Bond, *Purbeck*, 1908.

Purcell, Henry (c. 1659-95), Eng. composer. b. probably in Westminster, London. Tradition says that his father was Henry P., master of the abbey choristers, but it is now thought that P. was the son of Henry's brother, Thomas. P. was a chorister at the Chapel Royal. As a youth he was assistant to Hingston, keeper of the instruments at the Chapel Royal. His position was really that of an unpaid apprentice, and he succeeded Hingston as keeper in 1683, being made 'composer in ordinary' to the king in the same year. He succeeded Blow as organist of Westminster Abbey in 1679, having earlier been one of Blow's pupils. In 1682 he became one of the organists at the Chapel Royal. These official duties required the composition of much church music; his many anthems include *My heart is inditing and Thou knowest, Lord, the secrets of our hearts*. His *Te Deum* and *Jubilate*, written in 1694, are outstanding. P. also wrote some excellent chamber music, e.g. the celebrated *Golden Sonata*. He wrote an opera *Dido and Aeneas* and sev. quasi-operas and masques, notably *Timon of Athens*, collaborating with such poets as Dryden and Congreve in the productions. The 'Trumpet Voluntary,' originally entitled *The Prince of Denmark's March*, and actually written by Jeremiah Clarke (c. 1659-1707) was erroneously attributed to P. during the last century. P.'s music shows the influence of Blow and also of Lully and the It. operettists; its expressiveness and purity have never been surpassed by any other Eng. composer. He is Handel's equal in melodic beauty. P.'s music in the past has suffered from neglect because much of it was written for specific occasions, and later seemed to lose its point. He died in London, and was buried beneath the organ in Westminster

Abbey. See lives by P. A. Scholes in *The Book of Great Musicians* (22nd ed.), 1947; D. Arundell, 1927; A. K. Holland, 1932; and J. A. Westrup, 1937.

Purchase System, see COMMISSION, MILITARY.

Purchase Tax, tax introduced by Sir (later Viscount) John Simon, as chancellor of the exchequer, in the Finance (No. 2) Act, 1940, and levied on the purchase of certain specified goods from registered dealers (generally wholesalers) by unregistered persons (generally retailers). Sir John Simon introduced the tax as a source of substantial additional revenue for his second war budget (presented April 23, 1940). While discouraging unnecessary spending at home, P. T. was not intended to touch exports, raw materials, food, drink, or articles already subject to a heavy duty. A register of wholesalers was to be compiled and it would be the business of the seller to get the tax from the purchaser at the time he received payment for the goods. Sir Kingsley Wood, who succeeded Sir John Simon in the same year as chancellor and moved the second reading of the Finance Bill (May 29), revised the earlier plan considerably. He abolished the flat rate, which had been proposed by his predecessor and substituted a rate of 33½ per cent on the wholesale value of luxuries and goods which could be dispensed with or replacement of which could be postponed, and one of 16½ per cent on the wholesale value of a wide range of goods. In the lower rate schedule were included articles like clothing, boots and shoes (excepting children's clothing and footwear). In 1948 Sir Stafford Cripps reclassified goods liable to P. T., reducing the categories to four: (a) exempt; (b) 33½ per cent; (c) 66½ per cent; (d) 100 per cent, and in his budget announcement moved a large range of articles among these groups, the majority being reductions. Net excise receipts from P. T. were: 1946, £118,251,626; 1947, £181,105,011; 1948, £216,505,106.

Purdah (Hind. and Pers. *purdah*) (E. India), curtain, especially one serving to screen women from being seen by strangers; hence, figuratively, the Indian system of secluding women of rank.

Purfleet, former urban dist. of Essex, England, 7 m. S.W. of Tilbury with oil storage tanks. In 1936 it became part of the urban dist. of Thurrock. Pop. 8500.

Purgatives, see APERIENTS.

Purgatory ('a place of purgation' from Lat. *purgare*, to cleanse). In theology, the place in which the souls of the departed who die in a state of grace and yet have not fully expiated their sins at the moment of death are detained until they have done so. According to the council of Florence (1438-45), the souls in P. can be helped by the prayers of the faithful on earth. This doctrine is implicit in the practice, dating from early Christian times, of offering suffrages for the dead, and is based on 2 Mac. xii. 46. The doctrine of P. was denied by Luther, but was reaffirmed by the council of Trent (1545-63). It is held, though in a less

precise form by the Orthodox Church, representatives of which assisted in the formulation of the doctrine promulgated at Florence. The suffering of P. consists in being deprived of the vision of God.

Puri, see JÜGGernaut.

Purification, see ABLUTION.

Purification of the Blessed Virgin Mary, Feast of the (Feb. 2), originated in Jerusalem at the end of the fourth century, was adopted by Constantinople in 542, and spread throughout the E. and finally to Rome, perhaps under Gregory I (590-604). It commemorates the presentation of Christ in the temple on the fortieth day after his birth (Feb. 2) and the purification of Mary. It acquired its predominantly Marian character in the W. by the addition of the procession with candles in honour of Mary, under Sergius I. (687-701). See CANDLEMAS.

Purim, or the Feast of Lots, Jewish festival, commemorating the deliverance of the Jews of Persia from the plot of Haman, recorded in the Book of Esther. P. is celebrated on Adar 14. In ancient times the meal (*se'ulah*) was one of the main aspects of P., but the Temple authorities granted no recognition to this feast, refusing even to have the *Hallel* sung on it. The *Mishna* and the *Tosefta*, however, omit all reference to the P. dinner; they are concerned only with the reading of the *Megillah*, or 'scroll' of Esther. While all the laws of Judaism are traced to the Mosaic legislation, the regulation that this *Megillah* should be recited annually is a later addition.

Puritans, The, in the days of Elizabeth and the early Stuarts, name applied as a term of derision to a party in the Church of England who wished to purge the estab. eccles. system from so-called popish abuses. Later it came to include more revolutionary groups, many of which aimed at the entire destruction of Anglicanism. The name was in use at least as early as 1561, and refers to that purification in worship and doctrine to which all P. looked forward. The P. were all united in opposing the Church of England as they found it, but their constructive proposals differed vastly. This makes the P. in opposition (sixteenth and early seventeenth centuries) relatively easy to define; but the P. of the Civil war period, and of the era of disintegration which followed it, include so many types that generalisation is frequently dangerous. The two main divs. of P. in the sixteenth century (later known as Presbyterians and (congregationalists) both followed Calvinist doctrine, but differed in their views on Church government. But in the next century the term came to include Baptists, Unitarians, and Quakers, whose theology was frequently antinomian or Arminian. The earliest P. were a party within the estab. Church, regarding themselves as orthodox Anglicans, and (like Pryn and Prynne) heartily disliking and repudiating the name Puritan. But many later P. resisted the idea of any estab. Church, and professed toleration of other opinions in varying degrees.

Extreme Protestant views had penetrated into England under Edward VI., and during Mary's reign a number of clergy fled to Calvinist Geneva and absorbed Calvin's ideas (see CALVINISM). In spite of Elizabeth's attempt at a *via media* in Church affairs, therefore, a strong nucleus of potentially Puritan opinion existed in England even at her accession. Many of her bishops, Swiss exiles themselves, at first condoned the practice of a Protestantism more rigid than that envisaged in the settlement of 1559. Under Archbishop Whitgift the machinery of the high commission court (instituted in 1559) was vigorously used against the P., but such severity came too late. The number of P. increased, the movement being helped because there undoubtedly still existed in the estab. church the abuses of simony, pluralism, and many ill-paid and ignorant lower clergy for which the Church of pre-Reformation times had been blamed. In 1582 a gathering of Puritan clergy, under the leadership of Cartwright, expressed its discontent with the present condition of the church in a formal document, but this solidarity was only momentary. While Elizabeth lived the P., though by no means quelled, were held in check.

On James's accession the P. became more active, and at the Hampton Court conference 750 clergymen set forth what became the basis of the Presbyterian form of Puritanism in England. James, however, rejected their demands. Laud's religious policy brought many moderates into the Puritan party, and Puritanism became very largely anti-episcopal as a result of the actions of Laud and his colleagues. During the Long Parliament, which assembled in 1640, Presbyterian Puritanism seemed on the eve of realisation. In 1642 bishops were deprived of their seats in Parliament; episcopacy, including the hierarchy of archbishops and bishops, deans and chapters, etc., was abolished in 1645; the Book of Common Prayer was thrown over and its use declared penal; finally, in the same year, the 'discipline' was estab., whereby an attempt was made to enforce government by presbyteries in all churches throughout the realm. But this was never enforced, for, except in a number of restricted localities, full Presbyterianism never gained a wide following in England. Its power in 1645 depended largely on the influence exercised by the Scottish Army. Eng. Puritanism had some of its roots in anti-clericalism, and the minister was thus as distrusted as the Anglican parson. In a sense, too, though it was itself intolerant, it was an expression of a secular individualism which Scottish Presbyterianism did not at that time possess. In the years covering the commonwealth and protectorate it became clear that many P., particularly those in influential places, wanted little more than a modified Anglicanism; and the use of the Book of Common Prayer could not in fact be eradicated. The more extreme P. were divided into numerous sects, of which the

Congregationalists (as they later became) were probably the most influential, though the various Baptist groups were numerically fairly strong.

With the Restoration of 1660 the insecure fabric of estab. Puritanism was swept away and Anglicanism, with the episcopal system and all that went with it, restored. But the P. had a lasting effect on the estab. Church and Eng. society as a whole, even though they failed to capture it. The 'Eng. Sunday' still retains some of the Sabbatarianism fought for by the P., as opposed to the so-called 'Continental Sunday.' Latitudinarians and Evangelicals are the descendants of Puritanism within the Church, while those who refused to conform with Anglicanism formed a powerful group of nonconformist sects whose very existence and ideas have influenced every aspect of Eng. life. It was no accident that the Eng. radical political thinkers of the eighteenth century came frequently from dissenting families. The P. of Elizabethan and Stuart times had an inborn hatred of religious rituals and ceremonies, and sometimes (as in the case of Cromwell and Sir Henry Vane the younger), though not always, a longing for greater liberty of conscience. After the Restoration, when it became obvious that the P. could never convert the whole country to their way of thought, they began to press more generally for religious toleration, aiming merely at securing acceptance for themselves and thus, by circumstance, they became the champions of freedom of worship. But the practical expression of early Puritanism, where it did gain supremacy, as in the seventeenth-century Massachusetts, shows that serious and high-minded P. who abandoned England because of consistent religious persecution, proved as intolerant to those of differing views as their Eng. opponents had been to them.

The P.'s' noblest literary expression is in the pages of *Paradise Lost* and *Pilgrim's Progress*, while critics have pointed to a Puritan inheritance in the works of authors as different as Defoe, Hawthorne, George Eliot, Bernard Shaw, and Sinclair Lewis. Such a list illustrates the various and sometimes conflicting facets of Puritanism and the varying tendencies to which it gave rise. Thus while many P. were lovers of music, it is still true to say that the Puritan spirit was responsible for the temporary banishment of music from religious services. It was responsible, too, for the repeated outbreaks of iconoclasm which ruthlessly damaged and even destroyed historic churches and abbeys, and, in general, for that ill repute into which the arts and popular diversions alike fell. Until the twentieth century the theatre continued to suffer from this influence. On the other hand, the Eng. character is richer for the intellectual honesty and practical but simple faith which flourished alongside much that was undoubtedly destructive, in the greatest of the P.

See B. Dowden, *Puritan and Anglican*, 1900; W. Shaw, *A History of the English*

Church, 1640-60, 1900; S. R. Gardiner, *The First Two Stuarts and the Puritan Revolution*, 1902; S. R. Gardiner (ed.), *Constitutional Documents of the Puritan Revolution*, 1906; H. W. Clark, *History of English Nonconformity*, 1911; G. Friederich, *Das puritanische Neu-England*, 1924; A. F. Scott Pearson, *Thomas Cartwright and Elizabethan Puritanism*, 1925; R. H. Tawney, *Religion and the Rise of Capitalism*, 1926; P. A. Scholes, *The Puritans and Music*, 1931; A. S. P. Woodhouse, *Puritanism and Liberty*, 1937; W. Haller, *The Rise of Puritanism*, 1938; Margaret James, *Social Problems and Policy during the Puritan Revolution*, 1938; M. M. Knappen, *Tudor Puritanism*, 1939; and W. Schenk, *Social Justice in the Puritan Revolution*, 1949.

Purley, see **TOOKE, JOHN HORNE**.

Purley, urb. dist. (with Coulsdon) of Surrey, England, 2½ m. S. of Croydon, on the S. region of Brit. Railways. There are light engineering industries, and chalk quarrying. Pop. of Coulsdon and P. 63,000.

Purmerend, tn. in the Netherlands, on the N. Holland canal, 10 m. N. of Amsterdam. P. has important trade in cattle and cheese. Pop. 2,600.

Purniah, or **Purnea**, dist. and tn. of Bihar, India. In the Bhagalpur div. Over two-thirds of the area is cultivated, and rice is the main crop. The tn. lies 230 m. N.W. of Calcutta, and trades in jute. Area of dist. 4,998 sq. m., and pop. (dist.) 2,390,100, (tn.) 17,900.

Purple Colours are obtained by an admixture of red and blue light rays. The colours vary from scarlet to violet according to the predominance of the red or blue rays. In the case of *paints*, P. C. are obtained by mixing red and blue pigments in varying proportions. Tyrian P., which was held in great repute in the anc. world, was obtained from the juice of a shell-fish called *Murex* or *Conchylum*. Owing chiefly to the luxuriousness of the cloth made in those times, P. became a symbol of royalty, and the reference exists to-day for imperial purposes and for cardinals of the Rom. Catholic Church.

Purple Emperor (*Apatura iris*), handsome high-flying butterfly, with rusty black wings, lustrous in the male and with seven white spots and a transverse white band.

Purple Goatsbeard, see **SATYR**.

Purple Heart, military decoration of the U.S.A. It was the first decoration for conspicuous gallantry to be awarded by the U.S. Gov., being instituted by Washington in 1781. Later it fell into disuse, but was revived in 1932. During the Second World War it was given to all members of the forces who were wounded under circumstances entitling them to a wound stripe.

Purpura, genus of gastropod molluscs in the family of Muricidae, contains sev. sub-genera, and is itself typical of the sub-family Purpurinae. It is closely related to the stingwinkle and *Murex* (see **PURPLE COLOURS**). The species, often known as *whelks*, are all predatory, and *P. lapillus* feeds on the edible oysters after boring a hole through their shells.

Purser, officer in a ship's company who keeps the accounts and, usually, has charge of the provisions. In large passenger ships the P.'s dept. is of the greatest importance, and the P. will have as his assistant the chief steward and a personnel of between three or four hundred stewards. He is responsible for the entire victualling of the ship, amongst many other duties. He has to act as host to the passengers, a position requiring considerable tact. In smaller ships, such as cargo liners, a P. is not needed and a chief steward combines the two jobs. One of the duties of a P. is to make up the portage bill, which is a detailed account of the financial transactions of every member of the crew and the amounts due to each man when the ship pays off. The badge of a P. consists of two white sleeve-bands, that of a senior P. has three bands, and of an assistant P. one band.

Purslane (*Portulaca oleracea*), small succulent ann. herb, native of tropical Asia. It is grown in gardens, the tops of the young shoots being cooked and eaten as a vegetable or pickle. Winter P. (*Claytonia perfoliata*) is grown in France as a salad, and for cooking like spinach.

Pursuivant, third and lowest rank of heralds. Formerly Ps. were attendant upon the heralds from whom they learnt their craft, and many of the great nobles had their own Ps. who were often named after the armorial bearings of their masters. To-day the four Ps. of the College of Arms (Rouge Dragon, Rouge Croix, Bluenantle, and Portcullis) have virtually the same functions as heralds.

Purus, tribe of Brazilian Indians occupying the lower course of the R. P. They are of nomadic habits and live in temporary huts erected on swampy ls.

Purus, riv. of S. America. It is a trib. of the Amazon, rising in E. Peru, and joins the Amazon 110 m. above Manaus. It is 1900 m. long and navigable for 1600 m.

Purveyance, see **PRE-EMPTION**.

Pusan, see **PUSAN**.

Pusey, Edward Bouverie (1800-82), Eng. cleric, b. at Pusey in Berkshire, his father, the Hon. Philip Bouverie, having taken the name of P. on his succession to the P. estates. He was educated at Eton and Christ Church, Oxford, and in 1824 was elected a fellow of Oriel. He then went to Germany, where he studied oriental languages and theology. His antagonism to Ger. rationalism, which was one of the main causes of his later action, was caused by his knowledge of rationalism in its chief home. It was with the object of stemming the rising tide of rationalism in England that he joined Newman in the issue of *Tracts for the Times* soon after their inception (1833), and became one of the leaders of the Oxford movement. His own contributions were treatises dealing with the subject in an exhaustive and scholarly fashion. In 1836 he commenced the Oxford Library of the Fathers, a series of trans. of the works of the early writers. It was P.'s influence that prevented the

results of Newman's secession and later efforts from being greater than they were, and that mitigated in some degree the effects of the Gorham Judgment in 1831. P. house, in Oxford, a theological centre, is a memorial to P.'s life and work. See lives by H. P. Liddon, 1893-97; G. W. E. Russell, 1907; and L. Prestige, 1933.

Pushball, game played with a large ball, 6 ft. in diameter and weighing about 50 lb. It consists of pushing the ball under, or heaving it over, the bar of a goal, raised on posts 7 ft. from the ground. The former achievement gains five points, the latter eight points. The team consists of eight or eleven a side, and the playing field is generally about 150 x 50 yds. in size. P. is popular on board ship and sometimes goes by the name of 'medicine ball.' The game may also be played on horseback. P. originated in the U.S.A.

Pushkin, Alexander Sergeievich (1790-1837), Russian poet, b. in Moscow, pub. his first poems at the age of fifteen. After his education at the Tsarskoe Selo Lyceum, he was appointed to a post at the Foreign Office in 1817, and in 1822 went on official duties to Kishenev in S. Russia, partly to escape censure, if not exile, for a poem on liberty. A visit to the Caucasus inspired a romantic poem, *The Prisoner of the Caucasus* (1822), which was followed by the *Ode to Napoleon*, the *Lay of the Wise Oleg* (where the growing interest in national hist. is seen), and the fascinating study of gipsy life, *Tsugani*. P. became involved in various secret political societies, quarrelled with his chief, Count Vorontsov, and resigned his post 1824. In 1825 he pub. his fine tragedy, *Boris Godunov*, which marks the breaking with the Fr. tradition of the Russian stage and a movement towards Shakespearian drama. Though suspected of participation in the plot of the Dekabrista, his family influence was sufficient to save him. In 1828 appeared *Poltava*, a narrative poem of the times of Peter the Great and Mazeppa, followed by the account of the second visit to the Caucasus with charming lyrics. Receiving a gov. post in 1831, P. wrote his prose hist. of the Cossack revolt under Pugachev, his great prose romance, *The Captain's Daughter*, and what is probably his masterpiece, the poem *Eugene Onegin*, 1832, a mixture of humour, satire, and romance strongly reminiscent of Byron, whose influence is marked throughout P.'s works. In 1837 he fought a duel and was mortally wounded. P. was the founder of both Russian prose and poetry in its classic form, and the first link between Russian and W. literature. His deepest inspiration came from the heart of Russia—from Russian folklore, and he was the first to reveal the imaginative power and intuitive moral force of the Russian peasant. But, fundamentally, his talent was akin to W. culture, and influenced largely by the contemporary romantic school; and the spirit of this school mingled naturally with the Russian motive of pity, which, as a kind of inner revelation, solves the most complex moral problems. This is

shown markedly in those of his tales which illustrate his sympathy with Byronic Titanism, e.g. *The Pistol Shot* and *The Queen of Spades*. See lives by D. S. Musky, 1926; K. J. Simmonds, 1937; H. Troyat, 1946; and J. Lavrin, 1947.

Pushkin, tn. of the R.S.F.S.R., in the region of Leningrad, 15 m. S. of Leningrad city. Its original name was Detskoe Selo. It became the summer residence of the tsars and was renamed Tsarskoe Selo by Catherine the Great. After the revolution of 1917 the tn. was named P. Between July 1941 and Jan. 1941 it was held by the Gers., who devastated it before withdrawing. P. was famed for its fine imperial buildings housing works of art. Pop. 19,200.

Pushtu, language of the Afghanistan tribe of Pukhtus or Pathans. It is closely allied to the Iranian language, though modified to a large extent by Indian influences. See J. Darmesteter, *Chants populaires des Afghans*, 1888-90.

Puteoli, see POZZUOLI.

Putnam's. The New York publishing house of G. P. Putnam's Sons was founded in 1838 by George Palmer Putnam (1814-72) in partnership with John Wiley as Wiley & Putnam, changed two years later to G. P. Putnam, Broadway. A London branch was started almost immediately, and George Palmer Putnam for some years devoted much of his time to promoting the idea of international copyright. He arranged with Eng. authors for Amer. pub. of their work and voluntarily paid them royalties; indeed the stopping of 'piracy' of Eng. books by Amer. publishers was largely due to the pioneer work in the field of international copyright of George Palmer Putnam and his son, Major George Haven Putnam, who joined the firm after the civil war, and succeeded his father as head of it on the latter's death in 1872. He was joined by two brothers, when the house assumed the designation by which it is now known. In 1932 the firm came under the control of Melville Minton and Earle H. Balch, who merged with it their own publishing firm of Minton, Balch. The London branch of the firm became an independent Eng. publishing house in the early thirties under the style of Putnam & Company Ltd. and the chairmanship of Constant Huntington, who has directed its affairs for forty years.

Putney, suburb of London, opposite Fulham on the r. b. of the Thames, 6 m. S.W. of St. Paul's, London. The Univ. boat races start from here, and rowing and sculling matches are held. The famous P. Heath, leading on to Wimbledon Common and Richmond, is 1 m. distant. Pop. 70,900.

Putrefaction, decomposition and decay of animal and vegetable matter. Chemical change is brought about by bacteria, ptomaines being formed and malodorous gases given off. Decay is prevented, as shown by Pasteur, if the organic matter is sterilised and kept free from bacteria by hermetic sealing and the like.

Putrid Sea, see AZOV, SKA OF, and CRIMEA.

Putsch, Ger.-Swiss word, meaning thrust or push, and originally used colloquially of a shower. Since the twentieth century it has acquired an international meaning as an unexpected revolt of limited size and duration, aiming at an overthrow of the existing gov. by force. The most famous P. was the 'Munich beer-cellar P.' of Adolf Hitler and his followers in 1923. Other P's. include the overthrow of Stambolsky's dictatorship in Bulgaria in 1923, and the ousting of the Khaled al-Azm Gov. in Syria by Marshal Zahm on March 30 (1949), followed by his own assassination in Aug. (1949) in Gen. Hinnawi's counter-*putsch*. There have been frequent P's. in S. and Central Amer. countries.

Püttiala, see PATIALA.

Putting the Weight or Shot, sport of great antiquity which later came to be played with a cannon-ball or shot, classified as a 'weight,' i.e. 16 lb. The putting area of a 7-ft. square was in 1908 changed to a 7-ft. circle, edged in front with a toe-board, 4 in. high, the inside of which checks the putter's foot. The shot is held below the right ear, and the putter, balancing on his right leg, executes a sideways hop, landing near the centre of the circle on his right foot; the left leg follows through and is placed near the toe-board. The right leg bends; then both legs straighten; the shoulders are squared and the shot is delivered by straightening the right arm. A 'reverse' movement keeps the putter inside the circle. J. A. Torrance made the amateur world record in 1934 with 57 ft. 1 in. The Olympic Games record was made in 1918 by W. M. Thompson (U.S.A.) with 56 ft. 2 in.

Püttlingen, tn. of Saar Palatinate, Germany, 31 m. S.S.E. of Trier. Pop. 17,000.

Putty, plastic mixture of whiting and drying oil (linseed oil). It is used for glazing purposes and for filling holes in woodwork before painting. A paste of white lime and water is called plasterer's P.

Putty Powder, dioxide of tin, prepared from the scum or crude oxide formed on the surface of melted tin. This is removed, purified by calcination, and used as a polishing powder and for making white enamel and opal glass.

Putumayo, commissary of Colombia, occupying the drainage basin of the P. R. The cap. is Mocoa. Attention was drawn to the Peruvian rubber-growing districts of the P., owing to the reports of atrocities committed upon the native Indians employed in the collection of rubber by an Anglo-Peruvian company. The Brit. consul at Rio, Sir Roger Casement (q.v.), was sent to investigate, and reported in 1912, bearing out the truth of the reports. The Peruvian Gov. instituted reforms and estab. a commission to punish offenders. Pop. 15,800.

Putumayo (riv.), see ICA.

Puvls de Chavannes, Pierre Cécile (1824-98), Fr. painter, b. at Lyons. He was educated at the Lyons College. Henri Scheffer was his first master, and then

Couture. In 1852 he estab. a studio for himself and organised an academy for his fellow students. He first exhibited in the Salon in 1850, but the next two years saw his work rejected. In 1859 the Salon accepted his 'Return from Hunting,' but he did not attract serious attention until 1862 when he produced 'Peace' and 'War,' which were acquired by the state. These two, with four panels, are in the great gallery of the museum at Amiens. In Paris he decorated the Pantheon, the *hôtel de ville*, and the amphitheatre of the Sorbonne. His work became grand and serene in style, and perfect in its proportions and simplicity. He developed an entirely new style of wall-painting. Among his prin. pupils were Ary Renan, Haudouin, and Cottet. See lives by R. Jean, 1914, and C. Manclair, 1928.

Puy-de-Dôme, dept. of central France, S. of Allier dept. Plateau and mts. occupy three-fourths of it, plain and valley the rest. Branches of the Cévennes and of the Auvergne Mts. over-spread the E. and W. of the dept. The multitude of conical hills or *puy*s, of basaltic and lava masses, and of craters, shows the volcanic nature of the soil. The prin. riv. is the Allier (a trib. of the Loire). The soil is, in general, light and poor; but its volcanic character fosters vegetation, and the splendid valley of Limagne is fertile throughout and well cultivated. The climate is uncertain; the mts. are often visited by severe storms, and more or less covered with snow for six or seven months of the year. The chief products are wheat, rye, flax, fruits. The high pasture lands support large numbers of cattle, sheep, and goats. The prin. minerals are iron, antimony, and lead. There are sev. hot and cold mineral springs; among the most frequented are those of St. Myon and Chateaudon. The cap. is Clermont-Ferrand and there are four arrons.: Clermont-Ferrand, Issoire, Riom, and Thiers. Area 3080 sq. m. Pop. 478,700. (See illustration, p. 760.)

Pu-yi, Henry, see HOSAN TUNG.

Puzzle, see RIDDLE.

Pwllheli, seaport, municipal bor., and mkt. tn. of Carnarvonshire, Wales, on Cardigan Bay, 21 m. S.S.W. of Carnarvon. There is a small fishing fleet. Copper, manganese, and lead are found in the neighbourhood. P. became a bor. in the thirteenth century. Pop. 4300.

Pyæmia (πύωρ, pus; αἷμα, blood), disease due to the presence in the blood of pyogenic or pus-forming micro-organisms, usually streptococci and staphylococci. It differs from *septicæmia*, the general term for invasion of the blood by microbes, in the formation of metastatic or secondary abscesses. It is caused by the germs from an acute primary abscess shedding emboli, or particles of fibrin which are carried along in the blood-stream, where these emboli lodge; a metastatic abscess is formed, which is more or less dangerous according to its situation. The symptoms of acute P. are rigors and headache in the early stages; the skin becomes dry and hot, and

assumes a yellowish tinge; delirium and the breaking out of abscesses in various parts are characteristic of the later stages. The treatment should aim at maintaining strength by nourishing food, and stimulants should be unsparingly administered. Abscesses should be opened under antiseptic conditions and amputation should be resorted to promptly, if necessary. Sulphonamides, supplemented by penicillin if necessary, are extremely useful in the treatment of P. and septicæmia.

Pyapen, dist. and tn. of Burma, in the Irrawaddy div. Rice is grown. Pop. (dist.) 347,000; (tn.) 11,000.

a Rom. victory over Perseus, last king of Macedonia, in 168 B.C.

Pyelitis, inflammation of the renal pelvis, i.e. the expanded upper portion of the ureter where it is attached to the kidney. Infection may occur either from the blood-stream or from the bladder; the infecting organism is usually *Bacillus coli*, but it may be a streptococcus or staphylococcus. The attack is acute at first but may become chronic later. The symptoms of acute P. are abdominal pain, especially near the kidney; scanty deep-coloured urine, from which the bacteria can be cultured, and having a



D. McLeish

THE VOLCANIC ROCKS OF LE PUY, PUY-DE-DÔME

The nearer, 280 ft. high, is crowned by the church of St Michel d'Anguille dating from 962. The further, 435 ft. high, is surmounted by a gilded statue of the Virgin and Child composed of the metal of over 200 Russian cannon taken at Sevastopol.

Pyatigorsk, tn. of the Stavropol ter. of the R.S.F.S.R. on the Caucasian foothills. It is situated on the P. Podumsk, and has famous sulphur springs. It was in Ger. hands from Aug. 1942 to Jan. 1943. Pop. 62,800.

Pyenogonidae, or **Pantopoda**, small marine group of the Arthropoda found in large numbers in deep waters, and to a certain extent on the foreshore. The class includes numerous families. The commonest species is the *Pyenogonum littorale*, or common sea-spider, with four pairs of eight-jointed legs. It is found under stones at low water, but is often found clinging to an anemone in louse-like fashion. The largest form is the *Colossendeis gigas*, which measures nearly 2 ft. from tip to tip of its legs. This form is found only in the deep seas.

Pydna, anct. tn. of Macedonia, near the Thermaic Gulf. Originally a colony from Euboea, it was conquered by Philip of Macedon, 356 B.C. It was the site of

characteristic fishy odour; high temp. and other generalised symptoms. Urinary antiseptics, such as hexamine, and also the sulphonamides, are used in the treatment of P.; the urine should be maintained alkaline and ample fluids given. The chronic form is liable to persist for a long period. P. is sometimes a complication of pregnancy.

Pyeshkov, Aleskei Maximovich, see GORKY, MAXIM.

Pygmalion, in Gk. legend: 1. King of Cyprus, son of Cillix and grandson of Agenor. He fell in love with an ivory statue of a girl he had made, and Aphrodite breathed life into her. By her P. was the father of Paphos. Her name of Galatea is unauthorised. 2. Son of Belus and brother of Dido.

Pygmies, races of dwarf men whose average height is 57 in. for the men and 54 in. for the women. The cause of their small stature is not known. The Nerrillos, P. of the Congo forest, are probably

a branch of the Negro stock which separated at a remote period; those in the Kalahari region appear to be related to the Bushmen, and the Negritos, P. of Malaya, the Philippines, New Guinea, and the Andaman Is., are probably akin to the Papuans and an extreme variation of the E. Ulotrichi (Oceanic Negroes).

P. have been known since the third millennium B.C. when the Pharaohs sent S. for P. to dance before them (*see also* under DWARFS). In classical literature they are frequently mentioned by Homer, who speaks of them living on the shores of Ocean where their country was invaded by cranes in their winter migration, and by Aristotle, Herodotus, and others, all of whom suggest that they were distributed over a far larger area than at present.

In Africa they live mainly in the dense forest of the Congo basin within 6° of the equator, although some live further S. in the Bushmen's ter. Their skin is a reddish-brown or darker, their noses broad and flat, and their faces generally prognathous. They hunt with bows and poisoned arrows, trap game, and collect fruit. For cultivated produce such as maize the Congo P. rely on exchange with their Bantu neighbours who will accept their game. Sometimes a Bantu will become the patron of a small group of P. who do all his hunting for him. Both here and in the Kalahari they live on good terms with their neighbours. They live in small groups and belong to totemic clans, which are generally exogamous. The favourite totems are the leopard and chimpanzee and they will not kill or eat their totem, but it is doubtful whether they think themselves the descendants of the animal or that their spirit will pass into it after death. Their religion has been much influenced by their Bantu neighbours, and the Efé group at least believe in a power that they call *Tore*, who made all things and to whom all things belong. All the P. believe in a power associated with the instrument, the 'Lord of the Hurricane,' etc., and offerings of slain beasts and honey are made.

The Negritos are of similar physical type, but tend to be brachycephalic (round-headed), whereas the Negrillos tend to be dolichocephalic (long-headed). They also are hunters, except for the New Guinea group, who are vegetarians. In the Malay peninsula they use the blow-pipe and poisoned darts instead of the bow for hunting. On the Philippines there are sev. different groups of which the best known are the *Acta*, a name which is sometimes applied to all. They live in small groups, in New Guinea, in vils. administered by a headman and elders. They are polygamous and divorce is common. A divorced woman can be recognised because the top joint of her first finger has been removed. Of their religion little is known. It is even uncertain whether they are totemic or not. They believe in spirits in rocks, trees, etc., but beyond that nothing definite can be said.

None of the P. has a written language and it is doubtful whether they have even a language of their own. They seem to use that of their neighbours. Nor have they any arts; only the group on the Andaman Is. know the technique of making pottery. They are a kindly, backward people, possibly representing an early human type, infantile both mentally and physically.

See G. Burrows, *The Land of the Pygmies*, 1898; W. A. Reed, *Negritos of Zambales*, 1904; A. F. R. Wollaston, *Pygmies and Papuans*, 1912; L. J. Vandonbergh, *On the Trail of the Pygmies*, 1922; S. S. Dornan, *Pygmies and Bushmen of the Kalahari*, 1925; C. G. Selligman, *Races of Africa*, 1930; P. Schebesta, *Among the Congo Pygmies* (trans. G. Griffin), 1932 *My Pigmy Hosts*, 1936; and *Revisiting my Pigmy Hosts*, 1936; R. P. Trillos, *Pygmées de la forêt équatoriale*, 1932; and I. H. N. Evans, *Negritos of Malaya*, 1937.

Pyllades, in Gk. legend, son of Strophilus of Phocis and nephew of Agamemnon. The close friend of Orestes, he aided him to revenge himself on *Agisthus* and *Clytemnestra*, and married his sister, *Electra*.

Pylos, *see* THERMOPILE.

Pyloon (Gk. πυλῶν, gateway): 1. The mass of buildings on either side of the entrance to a temple in ant. Egypt, especially as exemplified by the two great Ps. of Edfu. The temple portal or P., as developed at Thebes, generally consisted of three parts, namely a monolithic corniced lintel on lofty side-posts, flanked by two truncated pyramidal towers with sculptured hieroglyphics. 2. Tower of lattice steel construction carrying overhead electric transmission lines in open country. The steelwork is supported on concrete foundations and protected by galvanising. The minimum clearance between the live wires and any part of the steelwork is 3 ft. 6 in. The standard single-circuit tower, type S₁, is 66 ft. 3 in. high and 15 ft. in breadth; the standard double-circuit, type D₁, is 78 ft. 3 in. high and 18 ft. 6 in. broad; both single and double have a cable span of 900 ft. The highest towers in the country are the double-circuit towers used for the Thames crossing at Dagenham; they are 487 ft. high, with a cable span of 3060 ft.; power is transmitted at 132,000 volts (being reduced to lower voltages in the areas where it is to be used). The suspension towers over the Forth are 338 ft. high, with a cable span of 3050 ft.

Pylos Stenosis, *see* under STOMACH.

Pylos (modern Navarino), ant. tn. on the W. coast of Messenia, Greece. It has been identified with the home of *Neleus* and *Nestor*. It was prominent during the Peloponnesian war, fortified by the Athenians in 425 B.C., and retained by them till its recapture by the Spartans in 409 B.C. *See also* NAVARINO.

Pym, John (1584-1643), Eng. statesman, b. at Brymore, Somerset. He studied at Broadgates Hall (later Pembroke College Oxford, and at the inner

Temple. He entered Parliament in 1614, and in a few years became one of the leading speakers in the House of Commons. He was a manager of Buckingham's impeachment (1626), a supporter of the Petition of Right (1628), and a vigorous opponent of the tonnage and poundage scheme (1629). He gradually became one of the most effective leaders against the gov.'s oppressive measures, and in 1640 was intimately associated with the impeachment of Strafford and Laud. He was amongst those who prepared the Grand Remonstrance (1641), and was one of the five members whom Charles I. came in person to Westminster to arrest (1642). It was P. who secured the Scots alliance. He was the most powerful man on the parl. side when war broke out. A great parliamentarian and an efficient organiser P.'s career is somewhat marred by his unscrupulous attack on Strafford, his former friend, during the attempt to impeach Strafford, and he would undoubtedly have taken an active part in the revolution. See life by S. K. Brett, 1943.

Pyorrhoea Alveolaris is an inflammation of the gums, causing a discharge of pus from the tooth sockets when in an advanced stage. The symptoms are swelling of the gums, which discolour to bluish, their softness, looseness, and inclination to bleed. The teeth loosen as the disease develops, and when far advanced may fall out. The pus may be swallowed with the food, or toxins may be carried in the blood and affect other parts, e.g. the heart. Sore throat and ulceration of the mucous membrane of the mouth sometimes indicate the approach of P. A. Persons under thirty years of age are seldom attacked. One of the possible causes is consistently inhaling through the mouth. Treatment can only be performed by dentists, and when advanced entails tooth extraction. *Gingivitis*, or inflammation of the gum margins, is a milder condition than P. A., and there is no discharge of pus.

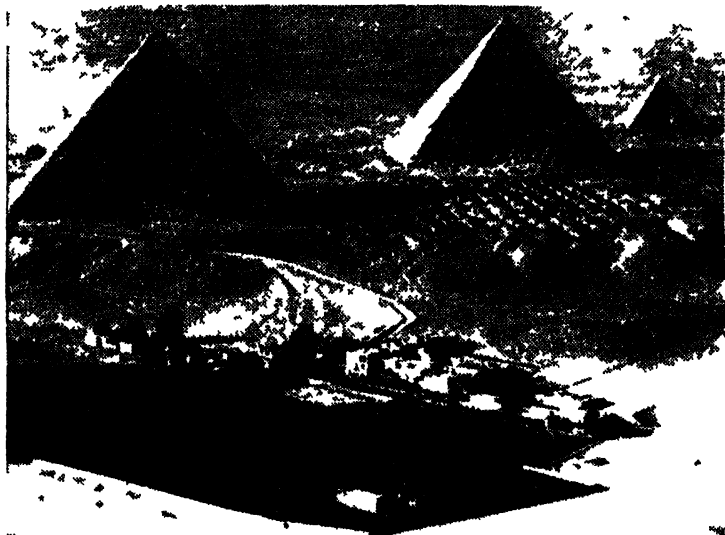
Pyramid, stone structure on a polygonal or square base with triangular sides sloping to an apex. As an architectural form the P. belongs peculiarly to middle Egypt from before 3000 B.C. during the fourth to the twelfth dynasties. A few miles from Cairo, lying in the E. desert, are the three great P's. of Gizeh, famous throughout the civilised world. These were built as tombs for kings. The greatest is that of Khufu or Cheops; it measures to-day at its base 755 ft. on each of its four sides, and it is 451 ft. high, though originally the apex must have been 30 ft. higher, and the base 20 ft. wider on each side. About 6,000,000 tons of stone were employed in the building of this mighty monument. It covers 1½ ac. of land. Herodotus asserts that it occupied 100,000 men for twenty years. The material was hewn from the quarries, on the opposite side of the Nile, floated across during the time of inundation, and dragged up to the P. over a stone ramp that took ten years to construct. The reign of Cheops must have

been chiefly occupied in building this tomb for himself. It was accomplished with forced labour, and such a feat of building could only have been possible when the state was enjoying a very highly finished organisation. At the completion of the great P. the faces were smooth and polished, but they now present a series of great steps formed by the courses of stone, and are in some places (particularly in the middle of each face, and at the angles, and about the entrance) much broken. The ascent is easy though fatiguing, and at the summit, from which a fine view is obtained, is a platform about 32 ft. square. In the third P., known as Menkaura's, the sepulchral chamber was not altogether hewn out of the rock as in the case of the two greater, but has a mado roof constructed with cantilevers of stone, which by not pressing against each other along the central line leave room for pressure to delay the collapse of the roof as long as possible. Usually the passages leading to the central chamber have smaller rooms occurring occasionally, blocked by stone doors that turn on a pivot; these were for the priests who came at intervals to minister to the royal dead. In the P. of Cheops a red granite sarcophagus was found, supposed to have been brought from Syene for the king; it bears no inscription. The little chamber below was called the queen's chamber, but at no time have these tombs been used for family purposes, always being built for the one royal body; individual burial was always a matter of importance with the anc. Egyptians. The second P. of Chephren contained a sarcophagus, also without inscription. The third, or Menkaura's, P. contained a very fine basalt sarcophagus, ornamented with panel decorations; the body of the king was also found buried in rubbish, obviously having been removed from its coffin by the spoilers of the dead. A caliph in 1226 rifled the tomb and carried away a quantity of treasure. The sarcophagus was lost at sea on its way to England; parts of the body and fragments of the inner wooden coffin were saved and are now in the Brit. Museum. Blind passages and false doors were constructed in these tombs to secure the dead lying undisturbed; many valuable objects being buried with royalty, it was necessary to prevent thieves from committing sacrilege. But of the multitude of P's. that are scattered over Egypt, sixteen only have been satisfactorily identified. Menkaura's tomb was cased round the base with granite; it appears to have never been properly finished, and the workmanship is inferior to the two greater P's., but more art was employed in its decoration. Many legends were formerly attached to this tomb, Menkaura being the Mykerinos of the Gks. A huge treasure of precious stones and metals was hidden in one of the chambers for the help of the country in time of great need, and laid under a curse if a thief should take them. Tradition tells us that perhaps Cleopatra found the treasure; in

any case the caliph found plenty of gold when he ransacked the tomb. The P of Zoser at Saqqara known as the 'step P' because of the style of its construction, has a labyrinth of passages and chambers paved with granite. Another P, that of Unas contained a basalt sarcophagus of fine workmanship, the walls of which were lined with alabaster and painted in beautiful designs. The chamber itself was decorated with well cut hieroglyphs. The little P of Medum is historically extremely interesting. It is dedicated to Sneferu (fifth dynasty) and the miniature temple connected with the tomb is

They are mere mounds of earth of which much of the pyramidal form has gone with the action of time. The sun P. is some 700 ft on each side of the base and rises about 200 ft. There is evidence of staircases and terraces and it is thought that they were once crowned with temples (see also ZIGGURAT). See L. V. Grinsell, *Egyptian Pyramids*, 1947, I. E. S. Edwards, *The Pyramids of Egypt* (Pelican Books) 1947, and E. J. Baumgartel, *The Cultures of Prehistoric Egypt* 1947.

Pyramids (game), see under BILLIARDS.
Pyramus and Thisbe, Babylonian legend. Ovid (*Métam.* iv 55-465) tells of



THE PYRAMIDS OF GIZEH
The Mena House Hotel is in the foreground

E 4

almost perfect. Many of the Ps have yielded great treasures to the archaeologist including the trinkets, jewellery, and furniture of the dead. The 1st tomb evolved gradually from the early first dynasty wood-lined chambers which grew to brick-lined mounds with earth then mounded with bricks, and so to the stone masses which are the typical 1s. These latter tombs were carefully planned before their building. Temples were placed to the W. of the tomb where the priests worshipped the departed king. Although it is known that bronze saws were employed, transport arrangements and organisation of the day to day work raise interesting problems. Various ancient structures found throughout Mexico include Ps, and many of these are at Teocuitatlan where the great earth Ps of the sun and the moon are situated.

Pyramus, a Babylonian youth who loved Thisbe. They had agreed to meet under a certain mulberry tree and fle together. Thisbe arrived first, but was terrified by a lion and ran away dropping her veil which the lion tore to pieces with its blood-stained jaws. This was found by Pyramus who thinking Thisbe was dead, slew himself. He returned and killed herself upon his corpse and the fruit of the mulberry was ever after red instead of white.

Pyrenean Dog (*Chien-berger des Pyrénées*) small short dog originating in the Pyrenées standing about 13 in. high. The 1 D is intelligent and agile, with long wavy sandy hair and proves an excellent sheep dog in mountainous regions.

Pyrenées, Basses-, frontier dept. of France formed out of the ancient provs. of Béarn, Navarre, and Gasconne. It

is bounded on the N. by Landes and Gers, on the S. by the Pyrenees, E. by Hautes-Pyrénées, and W. by the bay of Biscay. The W. part belongs to the Basque Region. The prin. riv. is the Adour, which is fed by many mt. torrents. About one-fifth of the area is covered with dense forests, marshes are common, and pastureland is good. Maize is grown; wheat, vines, chestnuts, and flax are also cultivated. Salt and other mineral springs are numerous, the most popular being Eaux-Bonnes and Eaux-Chaudes. Marble, copper, and iron are some of the mineral products. There are three arrons., Pau, Bayonne, and Oloron. The cap. is l'au. Pop. of the dept. is 415,800.

Pyrénées, Hautes-, frontier dept. of S.W. France, formed from parts of Gascony, and divided into three arrons.: Tarbes, Argelès, and Bagnères-de-Bigorre. The S. part is very mountainous, containing ramifications of the Pyrenees, with the peaks of Vignemale (10,820 ft.). Pic de Néouville (10,145 ft.), and Pic du Midi de Bigorre (9440 ft.). Between the spurs are picturesque valleys, fertile in the lower parts. The hills gradually descend to a plain in the N. In the N.E. lies the desolate plateau of Lannemezan. The chief riv. is the Adour, with its tribs. the Arros and Gave de Pau. The Garonne is on the S.E. frontier. There is much forest land, and wheat, maize, vines, tobacco, flax, and chestnuts are grown. Marble and slate are quarried and lignite, zinc, manganese, and lead are found. There are mineral springs, and flour, saw, and paper mills, etc., in the dept. The cap. is Tarbes; other tns. are Lourdes, Luz, Vic, Bagnères-de-Bigorre, and Marbourget. Area 1749 sq. m. Pop. 202,000.

Pyrénées-Orientales, maritime and frontier dept. of S. France, lying at the E. extremity of the Pyrenees and formed from the old provs. of Roussillon and Languedoc. The surface is very mountainous, except for the plain of Roussillon in the E. Oranges and other fruits, including vines, are grown. There are three arrons., Perpignan, Céret, and Prades. The cap. is Perpignan. Area 1598 sq. m. Pop. 228,800.

Pyrenees, Peace of the, treaty arranged between France and Spain on an is. of the Bidassoa in Nov. 1659. The chief terms were the cession to France of most of Artois, parts of Flanders, Hainault, and Luxembourg, Roussillon and Cerdagne, Pinerolo, Clermont, Stenay and the duchy of Bar; and a marriage was arranged between Louis XIV. and the Infanta of Spain, Maria Theresa.

Pyrenees, The, after the Alps, the grandest mt. system of Europe. Stretching for some 250 m. from the bay of Biscay to Cape Creus, they rise as a formidable barrier between France and Spain. Both to N. and S. their ridges present a regular terrace-formation, and are truly saw-like (sierra), for indentations are both sharp and shallow. The loftiest heights, including Néthou or Aneto (11,170 ft.) in the Maladetta group, Posets (11,047 ft.), Mont-Perdu (11,000

ft.), and Vignemale, are all in the central range. There are marked differences between the W. and E. sections. For instance, the precipitation is much greater on the Atlantic side, and this accounts for the wooded slopes and scenery here, which closely resembles that of the Ger. highlands. In the E. wild bare granite masses tower above vineyards, and olive groves, tamarisks, and aloes remind one of the proximity of Africa. The P. were mined in the times of the Carthaginians and Romans, and copper, silver, coal, lignite, lead, and iron are still found. Puigmal (9545 ft.) is the highest peak in this section. A comparison with the Alps will best throw into relief the characteristics of the P. (1) The latter range has only a few passes and those at a great elevation. Beyond the La Perthus (950 ft.), which extends from Figueras to Perpignan, the Col de Somport or the Pot de Canfranc (5355 ft.), along which wound the old Rom. road from Saragossa to Oloron, and the Col de la Perche (5280 ft.) between the valleys of the Tet and Segre, there are only footways and bridle paths. (2) Though there are numerous mt. streams (*gaves*) and waterfalls like that of Gavarnie (1515 ft.), no rivs. of size, except the Garonne, find their source in the P. (3) The glaciers cling to the mt. crests and do not penetrate into the heart of the valleys as in the Alps. (4) 'Cirques' are peculiar to the P. These are great amphitheatres of rock and mt. which shut in the upper ends of valleys, so-called because of their cauldron shape. The cirques of Cotatuero and Gavarnie guard the steeply ramparted valley of Arzac on the Sp. and Fr. sides respectively, and the cirque of Pinède is part of the sublime scenery of Mont Perdu. (5) There are many mineral springs on the N. face, but there are no lakes to rival Lucerne, etc. Again and again the inaccessibility of the P. has made them a secure retreat; it was here that the Christian refugees made a last stand against their Moorish oppressors. Within the range lies the republic of Andorra. See Count H. Russell, *Hiarritz and the Basque Countries*, 1876; E. E. Billborough, *Twist France and Spain*, 1883; H. Belloo, *The Pyrenees*, 1909; C. L. Freeston, *The Passes of the Pyrenees*, 1913; V. C. Scott O'Connor, *Travels in the Pyrenees*, 1913; C. Schuster, *Men, Women and Mountains*, 1931; V. Alford, *Pyrenean Festivals*, 1937; P. Arqué, *Géographie des Pyrénées françaises*, 1943.

Pyrenomyces, family of ascomycetous fungi, characterised by flask-shaped fructifications, which either open at top to liberate the spores or else decay. Some species are parasitic on plants, others on insect larvae, and some are saprophytes. *Claviceps purpurea* is the cause of the disease known as ergot of rye; *Cordyceps* attacks certain caterpillars. *Eurotium aspergillus* is the greenish mould which attacks jam.

Pyrethrum, genus of composite plants now usually included in *Chrysanthemum*, contains sev. well-known species. P. (or

C.) *Parthenium*, the feverfew, common in Britain and many other parts of Europe, was once a popular remedy against ague, and is said to be peculiarly disagreeable to bees. The dried flowers of *P. roseum*, and *P. cinerariifolium*, when powdered, are used to drive away insects.

Pyrexia, see under FEVER.

Pyrgi, auct. tn. of Etruria, Italy. It was the port of Cere. Stormed by Dionysius of Syracuse, 387 B.C., and became subject to Rome about 290 B.C.

Pyrgos, tn. in the dept. of Elis, Greece, 40 m. S.W. of Patras, with a port at Katakolon. Near it are the ruins of Olympia. Pop. 19,000.

Pyrhellometer, instrument for measuring intensity of solar radiation. In Ångström's P., devised in 1896, two thin similar platinum strips, of known area, have each a thermoelectric junction fixed to the rear for determining their temps. One strip is blackened and exposed to the sun and a measured current of electricity is passed through the other, and equality of temp. is indicated by a galvanometer connected with the thermal junctions. When this occurs it is assumed that the amount of heat introduced by the electric current is the same as that absorbed by the strip exposed to the rays of the sun. Knowing the former the latter can be determined. The solar constant (*q.s.*) is given in calories per square centimetre per min. Various corrections must be made to allow for loss of heat by reflection, by the effect of the air in carrying off some of the heat produced by the absorption of solar radiation on the blackened surface, and also by the re-radiation of great wavelength. More modern forms of P.s. have been devised to obviate these difficulties. See C. Maurain, *Étude pratique des rayonnements solaires atmosphérique et terrestre*, Gauthier-Villars, Paris, 1937; and C. G. Abbot, *The Smithsonian Standard Pyrheliometry*, Smithsonian, Misc. Coll., Washington, Vol. 110, No. 11, 1948.

Pyridine, C_5H_5N , aromatic base found in coal-tar oil (lower boiling fractions), bone-oil, or bone-tar, from which it is obtained by fractional distillation of the basic portion. It is a colourless mobile liquid (boiling point $115^\circ C.$), miscible with water, soluble in alcohol, ether, benzene, etc., and possessing a pungent odour. It is a strong base, forming crystalline salts with acids, but is very stable, and is not attacked by boiling nitric or chromic acids. It forms substitution products with halogens. It is used as a solvent, a denaturant for alcohol, and a catalyst in dye manuf., and in insecticides and fungicides, etc.

Pyrites (FeS_2), disulphide of iron, a commonly occurring mineral of a brassy-yellow colour, which crystallises in the cubic system (hardness 6-85). On heating in air it gives off sulphur, and is used in the manuf. of sulphuric acid and the sulphate of iron (copperas) of commerce. It may contain traces of gold and other metals, the former being profitably ex-

tracted from the residues of the 'wet copper' process. Identical in chemical composition and hardness is marcasite. Arsenical P. is the mineral mispickel ($Fe(SAs)_2$). Pyrrhotine is magnetic P. and is found in hexagonal crystals (hardness 3-5 to 4) which are paler in colour. Chalcopyrite or copper P. is one of the chief ores of copper, and forms tetragonal brass-yellow crystals which easily tarnish.

Pyritz, see PYRZYCE.

Pyrmont, see WALDECK-PYRMONT.

Pyrocatechin, **Pyrocatechol**, or **Catechol**, dihydric phenol known chemically as *ortho*-dihydroxybenzene. It is prepared by heating phenol-*ortho*-sulphonic acid with alkali, or by heating guaiacol (a solid contained in beech-wood) with hydriodic acid. It is a colourless crystalline solid, melting point $104^\circ C.$, soluble in water, its solution giving a green coloration with ferric chloride. Its alkaline solution acts as a reducing agent, and as such is used as a photographic developer.

Pyrogallie Acid, or **Pyrogallol** ($C_6H_3(OH)_3$), trihydric phenol formed from gallic acid, is a colourless crystalline substance (melting point $132^\circ C.$). It is readily soluble in water, the solution turning red with ferric chloride. Its alkaline solution rapidly absorbs oxygen, and becomes black, and for this reason is used in gas analysis. A powerful reducing agent, it is used extensively in photography for developers ('pyro').

Pyrography, see POKER-DRAWINGS.

Pyrola, or **Wintergreen**, genus of perennial plants (family Ericaceae), with flowers in a bracteate raceme. Four species are Brit., occurring somewhat rarely in woods in the N. These and others are frequently grown on the rocky and moist borders.

Pyroligneous Acid, crude liquor obtained from the destructive distillation of wood, from which acetic acid, acetone, and methyl alcohol are prepared.

Pyromancy, see DIVINATION.

Pyro-metallurgy, see METALLURGY (EXTRACTION METALLURGY).

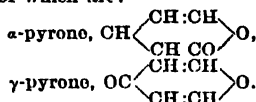
Pyrometer (Gr. *πυρ*, fire; *μετρον*, measure), instrument for the measurement of high temps. For rough measurements of high temp., in commercial work *etc.* forms of discontinuous thermoscopes were formerly used. Wedgwood, for example, utilised the shrinkage of clay rods in testing furnaces for the manuf. of pottery, whilst Seger's cones of clay are still used in some porcelain and brick works. These cones are made of specially blended clays that soften at definite temp. Prinsep designed a series of fusible alloys, each member of which melted at a definite temp. to cover the range from 700° to $1700^\circ C.$ for furnace work. In modern times it is not only necessary to measure temps. up to $2000^\circ C.$ in commercial work, but it is also found to be economic to measure temps. scientifically. All temp. measurements are reduced to the absolute or thermodynamic scale, and for practical purposes the reading of a hydrogen thermometer approximate very closely to that scale. One of the most widely used types of P. is the **Platinum Resistance**

P., the readings of which can be reduced to the hydrogen scale and therefore to the absolute scale. This P. makes use of the fact that the electrical resistance of a platinum wire increases as its temp. is raised. The instrument is calibrated in the usual way (see THERMOMETER) by finding the resistance of the thermometer at the upper and lower fixed points, and, in order to reduce its readings to the hydrogen scale, a third reading is taken when the thermometer is immersed in vapour from boiling sulphur, i.e. at a temp. 444.55° C. on the hydrogen scale. The platinum wire is enclosed in a special silica case, and it is plunged into the furnace. The electrical resistance is then measured by means of a form of Wheatstone bridge (q.v.) and the temp. of the furnace is deduced. This form of P. may be used for temps. up to 1200° C. and it can measure to $1/100^{\circ}$ C. The instrument is supplied for commercial direct reading work by the Cambridge Instrument Company. *Thermo-electric* P.s. are also very popular, and are made for direct-reading, continuous record work. Their mode of action depends on the fact that when a junction of two dissimilar metals is heated, a small electromotive force is generated in the circuit that includes the junction. The E.M.F. varies with the temp. of the junction, and the instrument is used in conjunction with a delicate galvanometer (q.v.). The instrument requires careful calibration, and this is done by the instrument makers. It has the big advantage of being able to measure the temp. at a precise point, since the dimensions of the junction are so small that it can be inserted in any small aperture. This convenience makes this type of P. popular for measuring temps. at different parts of rotating machinery, but they are not used for temps. above about 1000° C.

For temps. between 1200° and 3000° C. *Optical* P.s. must be used. These are properly called radiation instruments, since their measurements are based on the radiation emitted from hot bodies. They possess the advantage that it is not necessary to insert them into the furnace, thus exposing them to destructive heat; they are situated at some distance from the furnace, and the radiations from a small aperture in the wall of the furnace are allowed to fall on the instrument. The Cambridge Instrument Company supplies an optical P. of the 'disappearing filament' type for commercial work, in which a visual comparison is made between a standard electric lamp and the furnace viewed through absorption screens until exact matching is obtained. The temp. of the standard lamp filament is determined from a knowledge of the current supplied to it. Terry has designed a P. that is based on the fact that the radiation from a 'black body' (see RADIATION) varies directly as the fourth power of its absolute temp. (q.v.). In this instrument the radiation falls on a delicate thermojunction, and the E.M.F. generated is recorded by a galvanometer. The galvanometer readings are calibrated to record the temp. directly. See E. Griffiths,

Pyrometers, 1926; F. Royds, *The Measurement of Steady and Fluctuating Temperatures*, 1926; and T. Preston, *Theory of Heat*, 1929. See also *Dictionary of Applied Physics*, ed. Sir R. Glazebrook, 1922.

Pyrone, name given in chem. to an important group of compounds, the simplest of which are:



Derivatives of P.s. occur in nature, e.g. coumarin, the fragrant constituent of the Tonka bean and of woodruff.

Pyrops, see under GARNET.

Pyrosoma: 1. Genus of compound *Tunicata*. The colony takes the form of a cylinder closed at one end, and may be of any size from 1 in. to 12 ft. long. The individuals are placed with their brachial apertures outward and their atrial apertures towards the central cavity. The colonies are phosphorescent, and move about just below the surface of the sea. 2. Parasitic protozoan, *P. bigemini* is the cause of Texas fever in cattle. The infection is carried from beast to beast by a tick, in which the parasite undergoes a somewhat obscure stage of development.

Pyrotechnics, art of making fireworks for amusement, public rejoicing, and, to a growing extent, for utilitarian purposes. A firework consists of a container, or 'case,' charged with a mixture so compounded as to be capable of burning without help from the oxygen of the air. At least one ingredient must contain a readily liberated supply of oxygen. From earliest times this function has been performed by saltpetre (potassium nitrate), but since the beginning of the nineteenth century potassium chlorate has been increasingly employed. Simple firework mixtures were known in China and the E. from very early times, but it was not until the principle of the gun was devised, in Europe during the fourteenth century, that a mixture, suitable for use as a propellant, came to be known as gunpowder. Pyrotechnic mixtures are of two types: those producing force and sparks and those providing flame. The effect of the former takes place outside the case; partly consumed material, in the form of sparks, is thrown out by internal pressure. To this class belong fountains, golden rains, squibs, the well-known rocket, which is driven into the air by the reaction of the internal pressure, and those units which give motion to wheels and similar devices employed in public displays. With flame units the thinner paper case is consumed as the mixture burns. These are used for illumination, in the form of Bengal or coloured lights, 'lances,' employed to outline the design in pictorial set-pieces, and in the small stars, which form the 'garniture' of aerial fireworks; rockets and shells. Colours were made possible by the introduction of mixtures containing potassium chlorate and the salts of

various metals. In England Nov. 5, 'Guy Fawkes Day,' is the occasion for general private firework celebration; in the U.S.A. July 4, Independence Day, is similarly observed. Pyrotechnic signals, illuminating and incendiary devices, play a large part in modern warfare. At sea distress rockets and flares, and line-carrying rockets, save many lives. In agriculture insecticide smoke mixtures are recent introductions of great value. See T. L. Davis, *Chemistry of Powder and Explosives*, 1944; G. W. Weingart, *Dictionary and Manual of Pyrotechny*, 1937; and A. St. H. Brock, *A History of Fireworks*, 1949.

Pyroxene, name given to a group of minerals which have allied chemical and physical characters. They are silicates of calcium and magnesium, with iron, alumina, etc., and crystalline in two systems. The monoclinic Ps. include augite, diaspore, diopside, coesite, etc.; the rhombic Ps. are enstatite, bronzite, and hypersthene. In colour they are brown or green, ranging to black, and occur in basic igneous rocks. Ps. may change to amphiboles by weathering and metamorphism and vice versa. They form a parallel series with the amphiboles, from which they are distinguished by their cleavage angle (P. about 87°, amphiboles about 125°), feeble pleochroism, and high extinction angles.

Pyroxylic, or **Wood Spirit**, brownish inflammable liquid obtained by distilling the product of the dry distillation of wood after the tar has been separated, and the acetic acid removed by neutralising with lime. The liquid contains methyl alcohol, acetone, etc., and is used as a solvent and for 'denaturing' alcohol.

Pyroxylin, nitrated cellulose, produced by the action of nitric acid on cotton-wool. Nitric acid (18 volumes concentrated nitric acid with four volumes of water at 65° C.) is allowed to act on cotton-wool for about 10 min. The cellulose is converted chiefly into tetra- and penta-nitrates, which dissolve in a mixture of alcohol and ether (see GUN-COTTON). A solution of the mixed nitrates in alcohol and ether constitutes 'collodion,' which is used for photographic purposes. P. is also used in cellulose lacquers and in smokeless powders.

Pyroxylin Plastic, see CELLULOID.

Pyrrha, see under DEUCALION.

Pyrrhic Dance, war dance of the anc. Lacedaemonians.

Pyrrho (c. 360-270 B.C.), Gk. philosopher, b. in Elis, founder of the sceptical or Pyrrhonian school of Gk. philosophy. He studied philosophy under the Gymnosophists in India and the Persian Magi. His doctrines are chiefly known through the writings of his pupil, Timon the Sillographer of Phlius. His main principle is an utter indifference to dogma. Nothing is real but sensation, and nothing can be denied or affirmed with regard to any assertion so that the only proper attitude to life is one of imperturbability. See E. Zeller, *Stoics, Epicureans, and Sceptics* (Eng. trans. 1892); C. Wachsmuth, *De Timone Philiario*, 1859; and J. L. Robin, *Pyrrho et le scepticisme grec*, 1944.

Pyrrhus (Πύρρος): 1. King of Epirus (c. 318-272 B.C.). He was a great general and claimed descent from Achilles' son, the reputed founder of the race of the Molossians. As a child his right to the throne was upheld by Glaucias, and he was later assisted by Ptolemy of Egypt, becoming sole ruler of Epirus (295). He aimed at emulating Alexander the Great, and tried to win the throne of Macedonia; but though he acquired considerable territory in Macedonia, his brother-in-law, Demetrius, was chosen king. War broke out between them (291); Demetrius was forced to flee (287), but P. was soon superseded by the Macedonian Lysimachus (286). His next famous exploit was aiding the people of Tarentum against Rome (280). His defeat of the consul Laevinus at Heraclea was marked by such heavy losses that the phrase 'a Pyrrhic victory' came to mean a victory almost counterbalanced by misfortune. P.'s minister, Cineas, could not prevail on the Senate to make peace, and after defeating the Romans at Asculum (279) he went to Sicily to aid the Greeks against Carthage. On returning to Italy (274), he was crushed at Beneventum by the consul Curius, and forced to retire to Epirus. He made himself master of Macedonia again (273), and fell next year in a riot at Argos. See Plutarch's life; R. Schubert, *Geschichte des Pyrrhus*, 1891; and J. P. Mahaffy, *Alexander's Empire*, 1888. 2. Son of Achilles, see NEOPTOLEMUS.

Pyrrrole, colourless liquid of the formula C_4H_5N , boiling point 130° C. It smells rather like chloroform, and possesses both weakly acid and weakly basic properties. P. occurs in coal-tar and bone-oil, and can be synthesised by passing a mixture of acetylene and ammonia through a red-hot tube. Among important derivatives of P. are hematin, the red colouring-matter of blood, and chlorophyll, the green colouring-matter of plants. P. vapour turns a pinewood shaving moistened with hydrochloric acid a fiery red, hence its name (Gk. *pyrrhos*, fiery-red).

Pyrus, genus of trees and shrubs (family Rosaceae), which includes not only the apple, pear, quince, and medlar, but also a number of handsome trees and shrubs grown especially for the beauty of their bloom.

Pyrzyc (Ger. *Pyritz*). tn. of Poland, formerly in the Ger. prov. of Pomerania, Prussia, 24 m. S.E. of Szczecin (Ger. Stettin). Its chief manufs. are sugar and machinery. Pop. 13,000.

Pythchley, vil. in Northamptonshire, England, 3 m. S. of Kettering, noted on account of the P. Hunt founded about 1750. See H. O. Nethercote, *The Pythchley Hunt*, 1888.

Pythagoras (c. 570-c. 504 B.C.). Gk. philosopher, b. at Samos, son of Mnesarchus. About 531 he emigrated to Croton where he estab. a religious society under the rule of which that city enjoyed the hegemony in Magna Graecia. A conspiracy of his enemies, however, forced P. to withdraw to Metapontum where he died. The mass of legend which even in

ant. times grew round the name of P. is wholly fanciful. P. wrote nothing, though various works, including the P. theorem of Euclid, were attributed to him. From casual references in later writers it is learnt that his central belief was that of metempsychosis; the soul is purified by study. Thus the way of life or religion taught by P. was a combination of asceticism and the investigation of nature. P. discovered the numerical ratios which determine the prin. musical intervals, and his school was thus led to interpret the world through number. See F. W. A. Mullach, *Fragmenta philosophorum Græcorum*, I., 485-509, 1860-81; R. Hercher, *Epitolographi Græci*, 601, 1873; E. Zeller, *Philosophie der Griechen*, 1876-1909; J. Burnet, *Early Greek Philosophy* (3rd. ed.), 1920; Sir T. L. Heath, *History of Greek Mathematics*, 1921; H. Dieis, *Die Fragmente der Vorsokratiker*, 1922; and E. Frank, *Plato und die sogenannten Pythagoreer*, 1923.

Pytheas (Gk. Πυθέας) of Massilia (Marseilles) (fourth century B.C.), Gk. navigator and astronomer, probably a contemporary of Alexander the Great. He sailed from anct. Gaul to the W. and N. of Europe, visiting Britain and sailing round its E. coast for a considerable distance to the N. He was credited with visiting 'Thule'—the name that was given to the groups of the Orkneys and Shetlands—but this view is no longer accepted, and it is believed that his knowledge of these is, was merely derived from hearsay; and on another voyage journeying from Cadiz to the Tanais (Don, or perhaps the Elbet). He is traditionally supposed to have been the first to connect the spring tides with the phases of the moon. Only fragments of his *Ocean and Periplos* are extant. See A. A. Arguedon's ed. (1834); M. Fuhr's (1831-35); G. O. Lewis, *Historical Survey of the Astronomy of the Ancients*, pp. 466-80 (1862); P. H. Antichan, *Les Grands Voyages de découvertes des anciens*, 1881; F. Kähler, *Forschungen zu Pytheas*, 1903; M. Cary and E. Warmington, *Ancient Explorers*, 1929; and G. E. Broche, *Pytheas le Marseillais*, 1936.

Pythia, see DELPHI.

Pythian Games (Gk. τὰ Πυθια), one of the four great national festivals of anct. Greece, celebrated every four years at Delphi (Pytho) in honour of Apollo, to celebrate his destruction of the dragon (Python). Originally held every nine years, they were superintended by the Amphictyonic Council after 586 B.C. The laurel-wreath was first given as the prize in 582, and the various contests took place in the third year of each Olympiad. See A. Krause, *Die Pythien, Nemeen, und Isthmien*, 1841; T. Mommsen,

Delphica, 1878; and F. G. Schömann, *Griechische Altertümer*, II., 1861-3.

Python (Gk. Πύθων), in Gk. mythology, serpent produced from the mud and slime of the flood in the time of Deucalion. It lived in the caves of Mt. Parnassus, and, according to some anct. writers, delivered oracles at Delphi till slain by Apollo.

Python, genus of large non-poisonous snakes, belonging to the family of the Boidæ. They are found in most of the tropical parts of the old world, and sometimes reach a length of 30 ft. The *P. reticulatus* is the commonest species in Indo-China and Malay, while further W. the *P. molurus* is more common. The Ps. of Africa are smaller than those of Asia. The smaller Ps. feed on small mammals and birds; the larger on mammals of considerable size.

Pyx, small box, generally of precious metal, in which the consecrated Host is reserved or carried to the sick.

Pyx, Trial of the (Lat. *pyxia*, box or chest), final and public weighing and assaying at the Mint of the gold and silver coinage of the realm, by way of public attestation of its standard purity. The first regular public T. of the P., according to Madox, took place as long ago as the reign of Edward I., when the king commanded the Exchequer barons to open the boxes of the assay of London and Canterbury, and make the assay in such manner as the royal council used to do. This reference to the royal council shows how anct. the ceremony was, and indeed prior to Edward I. the king's council, by its deputies, conducted a private assay within the Mint as a condition of sanctioning the delivery of the coins to the owner of the bullion. Apparently this private ceremony was not a sufficient guarantee of the integrity of the coins, and hence it early became the custom to submit the coins to a public trial by a jury, repeated at short enough intervals to check improper issues of money. The trial is now conducted periodically by a jury of goldsmiths under the supervision of the king's recoinbrancer. In the reign of Edward III. it seems that the trial was held every three months; after that it was held at uncertain periods, but o-day it is conducted annually.

Each coin is not assayed separately, however; samples only are taken. The term 'silver' is now only a courtesy title for coin that since 1947 has been made of cupro-nickel. The trial takes place before representatives of the Treasury and Mint, and the Board of Trade are also represented, as that dept. provides the scales and weights for weighing the coins and the standard plates of the alloy whereby the fineness is tested.

Q

Q, seventeenth letter and thirteenth consonant of the Eng. language. It represents the Koppa of the earliest (Ik. alphabets, which (after the fifth century B.C.) survived only as a numerical symbol for 50. The Lat. alphabet adopted from Etruscan three signs having the phonetic value of *k*, *Q*, *K*, and *Q*. In time it dropped the *K*, and used *Q* for the sounds of *g* (the letter *i*, *q.v.*, was created at a later stage) and *k*, the letter *Q* being retained for the sound *k* when followed by *u*. In the oldest form of our alphabet there was no *q*, *qu* or *kw* being used for the sound of *qu*. In It. *q* is pronounced as in Eng., whilst in Fr. and Sp. *qu* takes the place of the absent *K*. Also in Eng. *qu* is in some words pronounced as *k*, *i.e.* *pique*, *oblique*, *liquor*, etc.

'Q,' see **QUILL**—**QUIN**, SIR ARTHUR THOMAS.

Qain, see **KAIN**.

Qalūbiya, div. of Lower Egypt. Area 361 sq. m. Pop. 690,000.

Qarimathians, see **KARIMATHIANS**.

Qasim, prov. of the Nejd, Saudi Arabia. It is a region of sand dunes with many oases in the hollows and lies S. of Jebel Shammar, from which it is separated by a steppe-desert. 'Anaiza is a large oasis and the chief city (pop. 20,000); the other large city is Buraida (25,000), which has large palm groves. Q. has had a chequered hist. bound up with the rise of the Wahabi power. After a rebellion in 1782 Q. relapsed once more into subjection to the Wahabi state of the Nejd. Later, when Arabia was under the Egyptians, Q. fell under the easy dominance of Turkish pashas. By 1850 Q. had fallen under the effective rule of Faisal ibn Sa'ud, in whose reign may be seen the real beginnings of the modern Wahabi state. The Quwasimi pirates of the Oman coast were notorious, and at one time had to be suppressed by Brit. naval vessels.

Qatar, peninsula of low barren hills projecting due N. for 120 m. into the Persian Gulf. Physically it forms part of the S. Arabian desert, *Rub' al Khali*. Q. is an independent sheikhdom of the coastal tract commonly known as Trucial Oman. The chief is Doha, also the residence of the chief. The 'Abhan Arabs of the Hasa had a colony at Zubara on the Q. promontory whence, in 1783 they descended and seized the Bahrein Is. from the Persian garrisons which had held them by conquest from the Hawala Arabs since 1753. The leading family of the 'Abhan still rules the Is. under Brit. protection.

Qattara Depression, area in the N. Libyan desert, covering about 7500 sq. m., and below sea level. There is a steep escarpment on its N. edge. The Q. D. formed the left-flank protection of the Brit. forces in the Alamein battle of 1942.

Qena, div. of Upper Egypt. Area 703 sq. m. Pop. 1,107,900.

Qisara, see **QISHARA**.

Qishm, see **KISHM**.

Q-Ships, name given in 1916 to those vessels used to decoy enemy submarines during the First World War. With them the name of (Capt. (now Adm.) Gordon Campbell, V.C., D.S.O., will always be associated. Based on the supposition that U-boats would conserve their torpedoes when faced with an unarmed merchant vessel and, instead, surface to attack with the gun, these Q. or mystery ships were disguised as peaceful merchantmen to cruise on the trade routes. But, with the pulling of a lever, the disguise could be cast off, guns disclosed, and fire opened instantaneously. The aim was to induce the U-boat to surface, throw open her conning tower and approach to within point-blank range. To achieve this it was generally necessary to give the appearance of abandoning ship with 'panic parties,' leaving the captain, signalman, and guns' crews hidden on board. Success demanded the highest degree of nerve and discipline. During the First World War 180 mystery ships of all sorts were fitted out but the number of U-boats for which they accounted was only eleven. Others were probably damaged. Unfortunately the first two or three Q-ships gave away the secret and caused the Gers. to use greater caution when more were available. With the introduction of the convoy system in 1917, the lone ship was treated with even more suspicion and Q-ships lost their effectiveness. A similar method of decoying U-boats was tried at the beginning of the Second World War, but the Gers. were ready for it, declined to surface, and used their torpedoes. See Rear Adm. Gordon Campbell, *My Mystery Ships*, 1928.

Quack, abbreviation of *quack-salver*: an unqualified medical practitioner, a seller of nostrums. Q. is a representation of the sound made by the duck, and conveys the idea of voluble self advertisement; 'salver' means healer. The term corresponds to the Fr. *charlatan*, from the It. *ciarlatano*, to chatter.

Quadi, anct. tribe of Germany, forming part of the Suevoi and inhabiting what is now Moravia. After being allies of Rome, they revolted in A.D. 167, together with the Marcomanni, the Chatti, and the Sazyges; they were subdued, but revolted again in 171; they were finally subdued in 173.

Quadragesima (Lat., fortieth). Lat. name for the season of Lent which begins forty days from Easter, without reckoning in the Sundays. The name is also given to the first Sunday in Lent by analogy with the Sundays that precede it.

Septuagesima, Sexagesima, and Quinquagesima. From it is derived the Fr. *carême*.

Quadrant, instrument formerly used by navigators to determine altitudes. It consists of a brass limb, the quarter of the circumference of a circle, and is graduated to one min. The zero of measurement, or the reading of a vertical line on the limb, was carefully determined in the fixed instruments, whilst in movable instruments of this type a plumb-line was used to mark the zero while an observation was being made. There were various varieties of Qs. besides the nautical, which were known either by the names of their inventors, as the Adam's, Collins's, Godfrey's, Hadley's, Gunter's, Sutton's Q., etc., or by the purpose for which they were intended, as gunners' and surveyors' Qs., or by special names, such as the mural Q., the horodietical Q., etc. The difficulty of constructing an accurate instrument and of making observations by the Q. led to the introduction of complete circle instruments, whilst the Q. for navigating purposes has been completely superseded by the sextant (*q.v.*).

Quadrant Electrometer, *see* ELECTRICITY.

Quadratic Equations, *see* under EQUATION.

Quadratic Surd, *see* under SURDS.

Quadrature, in astronomy, the position of a heavenly body, in which its direction, as viewed from the earth, makes a right angle with that of another heavenly body, usually the sun. In mathematics Q. is the process by which a square is found whose area is equal to that of a given figure. The problem is, of course, solved if the number of square units in the given figure is found. The problem of Q. has been associated from early Gk. times with the circle, and many intellects have been exercised and exhausted in fruitless efforts to 'square the circle.' The method of Qs. as applied to rectilinear figures presents no difficulty, as such figures can readily be reduced to rectangles. It is not possible to solve thus completely the problem of finding the area of a figure bounded by curves; but if a curve be regarded as made up of an infinite number of straight lines, it is possible to find its area without perceptible error. For example, the circle may be regarded as a regular polygon with an infinite number of sides, and there is a certain amount of justification for the assumption that what is true of all polygons will be true of the circle likewise. Now a polygon of n sides may be divided into n equal triangles; the area of each triangle is $\frac{1}{2}bh$, where b = base and h = perpendicular height from base to vertex. Area of polygon, therefore, = $\frac{1}{2}nbh$. But nb = perimeter of polygon, that is, in the case of the circle, its circumference, while h will be the radius. Area of circle, therefore, = $\frac{1}{2}$ circumference \times radius. The circumference, however, is 2π times the radius, π being an incommensurable quantity approximately = 3.1416. The area of the circle may therefore be stated as πr^2 . The method of Qs. in Newton's time is the same as Leibnitz's method of integration.

Quadrilateral, in geometry, a plane figure bounded by four straight lines. The area of a Q. may be found by dividing it into two triangles by a straight line joining opposite angular points. Taking this line as a common base, the area of the Q. may be stated as the number of square units obtained by multiplying the number of linear units in half the diagonal by the number of linear units in the sum of the offsets.

Quadrilateral, military term applied to four fortresses forming, as it were, the corners of a Q., and mutually supporting each other. The most famous Q. is that formed by the fortresses of Peschiera, Mantua, Verona, and Legnago, the two former on the R. Mincio, the last on the Adige.

Quadrille: 1. Name of a square dance of Fr. origin; four couples take part, and there are five separate and complete figures (Le Pantalou, L'Été, La Poule, La Tréaise, and Finaie), the whole forming 'a set of Qs.' It was popular in the early nineteenth century in France at the court of Napoleon I. and in 1816 was introduced to England by Lady Jersey, a leader of fashion at that period, and at once became amazingly popular. Numerous Qs. were written, the music being based on some opera or other theme popular at the time. Thus Chabrier composed a set of Qs. on themes from *Tristan*. 2. An old card game, played by four persons with a pack from which the tens, nines, and eights were removed. It superseded ombre about 1726 and was in its turn superseded by whist.

Quadrirème (*quatuor*, four, and *remus*, oar), anct. ship of war which had four banks of oars instead of the more usual three of the trirème (*q.v.*). It was first introduced by Dionysius of Syracuse.

Quadroon, *see* MULATTO.

Quadrumania, obsolete order of four-handed primates invented by Cuvier to include the apes, monkeys, and lemurs, but excluding man, who was placed in the order Bimana.

Quadruple Alliance, formed in 1718 between England, Austria, France, and Holland, with the primary object of thwarting the ambitious schemes of Cardinal Alberoni, the Sp. minister, who was bent on regaining for Spain some of the dominions she had lost by the terms of the treaty of Utrecht. The alliance was particularly advantageous to England, as it practically deprived the Jacobites of their hope of raising a successful insurrection by the aid of foreign troops. Spain was powerless against the Q. A., and her fleet, in spite of the absence of any formal declaration of war, was destroyed by Byng in the same year off Cape Passaro. In 1834 another Q. A., of Britain, France, Portugal, and Spain, was designed to exclude Dom Miguel from the Portuguese throne.

Quæstor, name common to two distinct classes of officers in anct. Rome: 1. The criminal *quæstors*, or, as Mitho styles them, Rom. commissioners, were a body to whom the great Legislative Assembly or Comitia, delegated its criminal juris-

diction. Maine thinks that in the earliest times a *questio* (commission) of this sort was appointed only to try a particular offender like the *questores paricidit*, who tried all cases of paricide and murder, though later commissions were appointed periodically without waiting for occasion to arise in the occurrence of some serious crime. Finally, when a *questio perpetua*, or permanent commission, was appointed, Rom. criminal jurisprudence had attained to a developed classification of crimes and a regular criminal tribunal. 2. The *questores classici* were officers charged with the superintendence of the *fisc* or public treasury. A special body, the military Qs., accompanied the consuls to the field, took charge of the military chest, and exercised supervision over pay, provisions, and booty.

Quagga, small and extinct S. African equine animal. As late as 1850 it was quite common in Cape Colony, and its extinction occurred within a few years through being killed in excessive numbers for its skin. It roamed in enormous herds on the open plains. It was from 13 to 13½ hands high, the upper body was coloured pale rufous brown, darker upon the face and neck, the stomach and legs were pure white; dark brown striping extended from the head a little beyond the shoulder. The ears and white flowing tail were more equine than asinine.

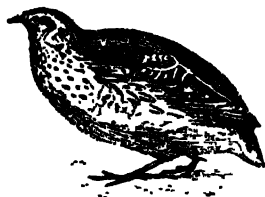
Quaglio, It. family which has produced sev. generations of celebrated artists: *Domenico*, 'the elder' (1723-60), an historical painter, b. at Laino. *Angelo* (1731-1815), his grandson, an architect, designer, and painter. Two of his pictures are in the Munich Art Gallery. *Domenico*, 'the younger' (1788-1837), grandson of Domenico 'the elder,' landscape and architectural painter, b. at Munich. He engraved twelve plates of architectural monuments, and pictures by him were acquired by *Lorenz*, 'the younger' (1793-1869), brother of the preceding, b. at Munich, lithographer and genre-painter. He painted a 'Tyrolean Inn,' in the Berlin National Gallery. *Simon* (1795-1878), a brother of the preceding, b. at Munich. Architect, lithographer, and theatrical painter. See E. Hora, *Die Künstlerfamilie Quaglio*, 1932.

Quaid-i-Azam, title of the Pakistani leader, Mohammed Ali Jinnah (q.v.).

Quail, or *Coturnix*, small genus of gamebirds, with a remarkably extensive range. The common Q. (*C. communis*) ranges over Europe, Asia, and Africa, and has been introduced into the U.S.A. and New Zealand. Great numbers spend the winter in N. Africa; and on starting in the spring to migrate northwards the flocks are lured by Q. calls and decoys, and are caught in huge nets extended along the shores of the Mediterranean. They are dispatched alive to various markets to be fattened and killed, the flesh being highly valued. The Q. is about 7 in. long, reddish-brown in colour, throat white with a black patch at the bottom; the breast is pale chestnut, and the belly yellowish-white. The nest is a small hollow in the ground, and in it are laid about ten yellowish-white eggs

blotched with brown. The bird feeds upon grain seeds and insects. The chestnut-throated species (*C. capensis*) is found in S. Africa. Another species, *C. japonica*, occurs in Japan and China. With both the common Q. freely interbreeds. The Virginian Q. (*Ortyx virginianus*) belongs to the sub-family Odontophorinae, with a hooked tip to the bill.

There are two small species of Indian bush-Q., genus *Perdicula*. These are the jungle bush-Q., *P. asiatica*, and the rock bush-Q., *P. argoondah*. The general colour of the former is brown above, with pale buff shaft stripes on the back, underparts white, with black cross-bars and throat rufous chestnut with whitish



QUAIL

edges. Like the jungle species the rock bush-Q. has the upper parts barred with buff and black or grey, but the rufous on the head and throat is dull brick colour and not bordered with white. The length of each is respectively 6.4 in. and 6.5 in. They have much the same wide distribution, but while the jungle bush-Q. affects forests and jungles, the rock bush-Q. prefers the dry rocky plains or low hillsides and barren sparsely cultivated dists. Very similar in size and general appearance is the painted bush-Q., genus *Microperdix*. There are three species: *M. erythrorhyncha*, which frequents the S.W. hills of the peninsula of India; *M. bleurili*, in the Central Provs.; and *M. manipurensis*, found in the S.E. Manipur Hills and Sikkim. They are marked by a well-defined white band between the eyes and tawny underparts, the last-named being the handsomest of the genus.

Qu'aitis, powerful tribe of the Hadhramaut, Aden Protectorate. Their fortunes began with their success in their protracted struggle with the Kathiris in the middle of the nineteenth century. It was not until 1877 that both sides, largely through the influence of the Brit. Gov. in India, arrived at an agreement by which Mukalla and Burum were handed over to the Q. for \$300,000. The Q. bound themselves not to dispose of any of the Hadhrami ters, to any person or power other than the Brit. Gov. and, in 1888, a protectorate treaty was concluded. In 1902 the sultan's old title of jemadar was abolished and he was recognised by the title of sultan. See H. Ingram, *Report on the Hadhramaut*, H.M.S.O., 1936, and *Arabia and the Isles*, 1942.

Quakers, see FOX, GEORGE; FRIENDS, SOCIETY OF.

Quaking Grass, or Maiden's Hair (*Brya*) genus of grasses with a loose panicle of short, flat pendulous spikelets. *B. media* is common in moors and pastures particularly in poor soil. *B. maxima* is often grown in gardens.

Qualitative and Quantitative Micro analysis, see under MICROANALYSIS.

Qualities, Primary and Secondary The qualities or characteristics of material bodies were differentiated by Democritus and the distinction persisted in philosophy. Primary qualities followed from the atomic structure and were mathematical, e.g. shape and size, secondary qualities, colour, heat, smell etc. were the result of action of the body on the soul or its senses. The former are inherent the latter due to reaction. The distinction forms an important basis for the dualistic theory of mind and matter, and as such was upheld by Descartes in his mechanical theory of the universe. The objective reality of matter as deduced from its primary qualities is insisted upon by both Descartes and Locke. Berkeley, however, strongly contested the point insisting that the primary and secondary qualities alike are purely subjective; there is no proof of existence outside or separate from the mind. The modern philosophy is now generally adopted. The scientific attitude however has displaced the philosophic and physics deals with qualities in their objective sense, psychology making an effort to analyse them subjectively.

Quamash (*Camassia esculenta*), bulbous plant of the hyacinth section of the lily family (Liliaceae) with blue and white flowers. It is native to N. America where its roots were roasted and eaten by N. Amer. Indians.

Quamoochi, or *Ipomoea*, name of several twining Mexican plants (family Convolvulaceae) with cordate leaves and red flowers grown on the pillars of greenhouses.

Quandary Peak, mt. of Colorado U.S.A. with a height of 14,266 ft. It is in the Park Range.

Quantification of the Predicate Propositions in logic were classed by Aristotle by *quality* as affirmative or negative by *quantity* as universal or particular. Quantity had reference to the subject, thus, 'All quadrupeds are animals.' Sir W. Hamilton 'quantified' the predicate thus distinguishing propositions further. The one quoted does not state whether all quadrupeds comprise all animals or not and by quantifying the predicate we write, 'All quadrupeds are some animals' thus stating whether the whole or only part of the predicate agrees with or differs from the subject. Aristotle considered affirmative propositions to have a *particular* predicate, and thereby excluded a whole class in which both terms were universal, e.g. 'The greatest truths are the simplest truths.' The number of propositions is largely increased, but many of the processes of logic are simplified. George Bentham, *Outline of a New System of Logic* (1827) introduced the subject. Dr Morgan, Thompson, and Boole used the system. See bibliography under LOGIC.

Quantitative Magnetism, see under MAGNETISM.

Quantity Surveying The work of the quantity surveyor consists of compiling a bill of quantities, a document containing a full description of each article and the quantity required for the erection of a particular building, prepared from a set of architects' plans. A recruit to the profession has to learn a new form of mathematics termed the 'duodecimal system' adapted for more speedy assessment of superficial and cubic quantities and in the working up stage and to read architects' plans and 'take off' from them that a bill of quantities may be prepared all in accordance with an established method known as the *Fourth Edition of the Standard Method of Measurement*. In addition to compiling a bill of quantities it is necessary to be able to prepare an estimate of cost and thus give such information as will assist both the architect and building owner to arrive at their final decision. When a scheme is approved and the bills of quantities prepared these are then sent out to a selected list of building contractors usually between six and twelve, and then in turn the contractors' quantity surveyors prepare the bill and submit to the architect his estimated cost in the form of a tender.

The profession can be described as 'the backbone of the building industry' in addition to the knowledge of mathematics the quantity surveyor must have a technical training in building construction with a complete knowledge of materials, and of land surveying and levelling so that he can estimate the work to be carried out on building sites. Furthermore he must be conversant with Acts of Parliament in so far as they concern building and contract law and with local and local authority by laws which vary a great deal in England. There are two distinct types of work available to the beginner, that of the professional quantity surveyor and of the building contractor's quantity surveyor. In the case of the former training is usually obtained by entering a professional office as an articled pupil. This necessitates a written agreement binding the parties for a period usually from three to five years and involving a premium. The contractor's quantity surveyor obtains his training by entering a firm of building contractors at the age of sixteen or seventeen years. A premium is not usually required, and a small salary is paid at commencement. The student usually gains the necessary technical knowledge and education by postal tuition through a course with a correspondence college specialising in training for the profession or alternatively by attending evening classes at a recognised school of building technology.

The principal professional institutes are (1) the Royal Institution of Chartered Surveyors (R.I.C.S.) Great George Street Westminster, London S.W.1 which offers membership for all grades of surveyors including estate agents but only to the

professional applicant; and (2) the Institute of Quantity Surveyors (I.Q.S.), 98 Gloucester Place, London, W.1., which represents solely the interests of quantity surveyors and offers membership (by examination) to both the professional and contractor's quantity surveyor.

Quantity Surveyors, Institute of, see preceding article.

Quantock Hills, range of coastal hills in N.W. Somersetshire, England, extending 8 m. towards Taunton. They form a series of irregular ridges from which extensive views of the Welsh hills can be obtained, and they consist chiefly of greywacke and limestone. The chief height is Willsneck, 1270 ft. At Nether Stowey, 8 m. W. of Bridgwater, there are two cottages where the poet Coleridge lived from 1797 till 1800. Much of his best poetry was written here, including *Rubia Khan, The Ancient Mariner*, and the first part of *Christabel*.

Quantum Theory. This theory was first proposed by Max Planck (q.v.) at the beginning of the present century following his investigation on 'black body' radiation (see RADIATION). The laws of classical dynamics had failed to account for the distribution of the radiant energy from a 'black body' between the various wave-lengths in the spectrum of the radiation. Planck made the bold, tentative assumption that the energy emitted by any 'vibrator' was parcelled out in discrete multiples of some fundamental unit or quantum of energy. Sir James Jeans has happily compared this idea with the manner in which an automatic machine can only deliver its goods in units. Such a machine will deliver a quantum of chocolate or a quantum of toffee, but it cannot deliver fractions of a bar of chocolate or of a packet of toffee. Expressed in mathematical form Planck's theory states that if E is the amount of radiated energy of wave-length λ , then $E = nh\nu$, where the symbols have the following meanings: ν is the frequency of the radiation corresponding to the wave-length λ , and is equal to c/λ , where c is the velocity of light in *vacuo*, almost 3×10^{10} cm./sec.; n is any integral number, 1, 2, 3, etc.; and h is Planck's Constant. The value of h is very small—only 6.55×10^{-27} sec./erg. (see ENG). Jeans gives a very useful comparison of the magnitude of h in *The New Background of Science* (chap. v.). He points out that in the complete oscillation of the pendulum of a grandfather clock about 66×10^{20} times the energy of h is expended. As an example of the use of the energy formula given above, suppose we require the energy in a particle of light—a *photon*—of wave-length 10^{-4} cm.; this implies a frequency of $3 \times 10^{10}/10^{-4} = 3 \times 10^{14}$. Hence $E = 3 \times 10^{14} \times 6.55 \times 10^{-27} = 19.65 \times 10^{-13}$ erg. A photon of light of half this wave-length or twice the frequency would have twice this energy. It should be noticed that there is no fraction of h , which represents the *minimum* of energy that can be delivered—the *quantum*, and that E varies according to the total number n of quanta taken

into consideration. The only justification at the time for Planck's ingenious idea was an important one—it worked, but naturally this Q. T. of radiation was accepted with some hesitation, since it involved a declaration of the failure of classical dynamics to cope with the problem. Modern physics, however, has developed at an enormous rate since then, and each advance in the field of atomic physics has emphasised the importance of the Q. T. One of its earliest applications was to the phenomenon of photo-electricity (q.v.). The photo-electric effect shows no time lag, i.e. it begins as soon as the metallic surface is illuminated. Further the velocity of the ejected electrons depends only on the wave-length of the illuminating light, not on its intensity. These facts defy explanation by means of the wave-theory of light, but Einstein explained them by means of the Q. T. Briefly the velocity with which an electron is ejected in the photo-electric effect is given by the Q. T. equation of Einstein: $\frac{1}{2}mv^2 = h\nu - W$, m being the mass of the electron, v its velocity, and W the work done in breaking loose from the surface of the metal when the latter is illuminated by light of wave-length $\lambda = \frac{c}{\nu}$ where c is the

velocity of light in *vacuo*. The equation shows that the kinetic energy $\frac{1}{2}mv^2$ possessed by an electron is obtained from the energy $h\nu$ of a light quantum.

In 1913 the theory was applied by Bohr for the calculation of the frequencies of light emitted by atoms in the gaseous state (i.e. their characteristic line spectra). To account for the stability of atoms which are made up of a positively charged nucleus and negative electrons, it appeared necessary to assume that the electrons moved at high speed around the nucleus, each atom forming, in effect, a miniature solar system. According to classical theory there was no reason why orbits of particular dimensions and energy should be more stable than others, whereas the fact that only light of particular frequencies was emitted indicated that only particular energy losses as radiation could occur. With the aid of the Q. T. Bohr produced models of atoms which explained very successfully much of the detail of the characteristic spectra, although it still remained a mystery why only certain orbits were possible. The Bohr theory was extended by Sommerfeld and others, and was applied to X-ray spectra, as well as spectra of the visible, ultra-violet, and infra-red regions. The Q. T. also proved highly successful in connection with theories on such diverse subjects as those of specific heats, electrical conduction, chemical combination, and the periodic table of the elements.

Nevertheless certain difficulties remained. In the first place it appeared impossible to explain certain characteristics of spectra unless somewhat artificial assumptions were made; in the second, although such particles as electrons and protons apparently always behaved

as particles and never as waves, radiation had perforce to be regarded sometimes as particles and sometimes as waves. In 1924 de Broglie put forward views which, when developed by Schrödinger, Heisenberg, and others, led to the new Q. T. According to this theory electrons and protons are themselves to be regarded as a wave motion. This surprising conception has been completely justified in experiments that have shown that beams of electrons or protons can give rise to diffraction effects, and so possess one of the fundamental attributes of wave motion. The new theory explains why electron orbits in atoms can have certain magnitudes and no others, and has been completely successful in problems where the older one appeared to lead to anomalies. See E. U. Condon and P. M. Morse, *Quantum Mechanics*, 1929; L. I. Frenkel, *Wave Mechanics*, 1936; L. I. Schiff, *Quantum Mechanics*, 1919; also Sir J. Jeans, *The Mysterious Universe*, 1931, and *The New Background of Science*, 1934; and P. Karlson, *You and the Universe*, 1934.

Quantz, Johann Joachim (1697-1773), Ger. flautist and composer, b. at Oberscheden in Hanover. He made a tour of the different European caps, charming all hearers with his dexterity of performance. He secured the patronage of Frederick the Great, whom he had instructed when Crown Prince. He composed 300 flute concertos and a number of smaller pieces: his *Guide to the Flute* has been universally popular. See studies by A. Quantz, 1877, and A. Raskin, 1923.

Quanza, see COANZA.

Quarantine (Fr. *quarantaine*, period of forty days), period during which a ship suspected of having cases of infectious disease on board is detained from communication with the shore. As originally instituted Q. was practised for the plague, and later for yellow fever and Asiatic cholera. The first Act of Parliament concerning Q. in England was passed in 1710, but Q. in the original sense is abolished now in England, America, and sev. European states, though the name is still applied to the modern detention methods which have superseded it. In England the Public Health Act, 1896, vested Q. powers in the Ministry of Health. The initial steps in detaining a vessel may be taken by officers of the customs, coast-guard, or Board of Trade. All persons on board the suspected ship are examined by the medical officer of the port; those infected are removed, if possible, to a hospital; those in immediate attendance on the infected cases are detained for forty-eight hours; and the ship is then thoroughly disinfected.

The importation into Great Britain of certain animals, once any necessary licence has been obtained from the Board of Trade, is subject to various Q. regulations outlined in a form issued by the Ministry of Agriculture and Fisheries (Animal Health Div.). In the case of dogs and cats a licence is required, under the Importation of Dogs and Cats Order

of 1928, to authorise the landing of the animal for Q. in Great Britain. Every such licence requires the detention and isolation of the animal for six months after landing on premises approved by the minister.

Quaregnon, tn. in Hainaut, Belgium, 4 m. W. of Mons. It has important coal-mines and quarries of limestone. Chief industries are the production of coke, iron, steel, copper, and engineering. Pop. 17,800.

Quare impedit. When an eccles. benefice becomes vacant by the death, cession, etc., of the incumbent, unless the patron present his clerk, that is, a clergyman, to the bishop of the diocese for institution within six calendar months, the right will lapse to the bishop, who may collate to the vacant benefice. But if a presentation be made within this time and the bishop refuse to institute, the patron may obtain redress for this interference with his right of patronage by applying for a writ of Q. I. ('why he hinders').

Quarenghi, Giaomo (1744-1817), It. painter and architect, b. at Valle Imagna, Bergamo. He migrated to Russia, where he exercised a great influence over the development of architectural art.

Quaritch, Bernard (1819-99), Eng. bookseller and publisher, b. in Worbis, Saxony. He came to London in 1842, and after working for a few years under Bohn, the publisher, set up for himself in a small second-hand business off Leicester Square. He began purchasing rare books in 1853, and in 1873 pub. a catalogue of the earliest productions of the printing-press of all countries, entitled *Bibliotheca Xylographica, Typographica et Palaeographica*. He moved to larger premises in Piccadilly, and was a bidder for all the rare eds. of books at sales, and gradually developed the largest trade in old books in the world. The various catalogues pub. by him are of great bibliographical value.

Quarles, Francis (1592-1614), Eng. poet, b. at Romford, Essex, and educated at Christ's College, Cambridge. In 1613 he became cup-bearer to Princess Elizabeth of Bohemia, and was later appointed secretary to Ussher, archbishop of Armagh, Ireland. About 1633 he returned to England and began preparing his *Emblemes* (1635), the work by which he is best known; they consist of paraphrases from passages of Scripture and the Christian Fathers, concluding with epigrams. In 1630 Q. was made chronologer of the city of London. Other works are *Hadassa* (1621); *Stons Sonets sung by Solomon and periphra's'd* (1625); *Hieroglyphikes of the Life of Man* (1638); *Enchiridion* (1610-41), etc. A complete ed. of Q.'s works was pub. by A. B. Grosart (1880-81).

Quarrel of Ancients and Moderns, see ANCIENTS AND MODERNS.

Quarry and Quarrying (O.F. *quarriere*; Low Lat. *quadrarin*; Lat. *quadratus*, square), place from which stone is excavated; the process of excavating. The term 'quarry' is susceptible of somewhat loose restriction and extension; it is usually but not always restricted to workings in the open air, as distinguished

from mines; it is sometimes used in connection with material not directly used for construction of buildings, e.g. chalk. The suitability of a stone for quarrying depends on (1) its quality or value; (2) cheap and ready conveyance to a large market; and (3) its inclination and depth below the surface. The principal deposits worked by quarrying are sandstones, limestones, ironstones, slates, granite, etc. The sandstones are classified as flagstones, freestones, and tilestones. A thick deposit of sandstone may provide all three classes of stone at different levels or 'lifts.' (The mechanised underground quarries at Bath produce about a quarter of Britain's building stone.) Deposits that outcrop on the surface are best won by open-pit work or quarries, while thick or deep deposits are worked by underground methods. In open-pit work it is sometimes necessary to remove the soil or waste rock over the valuable stone before excavation can start.

In most rocks there are planes or joints along which the material will split or part readily. Even in a massive rock like granite there are vertical or highly inclined 'joints' which extend for long distances. Sedimentary rocks have bedding planes along which the stone can be readily divided. To 'cleave' means to split into laminae or leaves. Slate is the best-known example of a cleaved rock. It was deposited originally as a clayey bed which in time hardened into shale. Later this shale was submitted to immenso lateral or side pressure, and its tiny particles rearranged so as to give the rock a slaty cleavage. The cleavage-planes are perpendicular to the direction of pressure. The best slates are obtained from various parts of N. Wales. The quarries are mostly 'open,' but sometimes the slate occurs at some depth which necessitates underground methods to extract it. The slate is cut into large blocks, which are divided by splitting into slabs about 3 in. thick. These go to the sawing tables where they are cut to dimensions suitable for fine splitting, which reduces them to thin sheets about one-seventh of an inch in thickness. This operation may be performed by hand or the slabs can be split, sawn into shape, and planed smooth by machinery. A slate quarry provides roofing-slates and thick slabs used for tombstones, cisterns, and billiard-tables.

The nature of the deposit and general conditions determine the method of excavation and machinery to be used. Small quarries still employ manual methods, such as pick, shovel, and wheelbarrow, with carts and lorries. The stone is excavated by drilling and blasting with gellignite. Large quarries may employ power shovels, bulldozers, drag-line or bucket excavators, and locomotive cranes on tracks. The power shovel, which is employed extensively, is mounted on tread tractors and operated by electricity or by a Diesel engine. The shovel can handle from 1 to 5 cub. yds., depending on its capacity and the material quarried. A machine mounted on cater-

pillar tracks with a cutting chain, known as the arc-shearer, can cut the stone horizontally or vertically. Automatic jacks lift the machine for top or over-cutting. Electric cranes are then used to remove the blocks of stone, which are swung on to trucks or wagons. A rock planer is sometimes used in limestone quarries which 'shaves' or planes off portions of the stone at the rate of 50 tons per hour, with only two men in attendance. Mechanical picks worked by compressed air or electricity are also used extensively. The excavated stone is then hauled to market or to the screening, crushing, or refining plant by lorry, wagon, or road locomotive.

Quart, Eng. measure of capacity, being equal to two imperial pints and the fourth part of a gallon. In the old measures a Q. of beer contained 70.5 cub. in.; a Q. of wine 57.75 cub. in.; and a Q. 67.2 cub. in. A Q. of water contains 69.3185 cub. in. and weighs 2½ lb. avoirdupois. It is equal to 1.1359 litres. See WEIGHTS AND MEASURES.

Quarter Days, appointed for the payment of house and land rents, and for the incoming and outgoing of tenants, occur on March 25 (Lady Day), June 21 (Midsummer Day), Sept. 29 (Michaelmas Day), and Dec. 25 (Christmas Day).

Quarter-deck, originally a smaller deck placed above the half-deck and covering about a quarter of the vessel. It is now used for that part of the spar deck extending between the poop and the mainmast, used by officers only and in passenger vessels by first-class passengers.

Quartering, see under HERALDRY.

'Quarterly Review', Tory review of essays, politics, and general literature, estab. in 1809 by the celebrated publisher John Murray, as a competitor of the Whig *Edinburgh Review*. The first editor was Wm. Gifford (q.v.) who held that post till 1824, and one of its most prolific early contributors was Robert Southey. Other celebrated contributors were Scott, John Taylor Coleridge, a barrister, who became editor for a short while, Wm. Hazlitt, J. G. Lockhart (Scott's son-in-law, who succeeded Coleridge as editor), Canning, Gladstone, Salisbury, Ruskin, Borrow, Dean Stanley, Layard, Wilberforce, Cromer H. A. L. Fisher, Sir F. Pollock, Sir James Fraser, and others. Gifford was also a contributor; but the critiques and satirical poems which appeared in the *Q. R.* while he was editor were marred, like his attacks on Hazlitt, Leigh Hunt, and Charles Lamb, by their intention to annihilate every one who held views contrary to Peel, Canning, or other Tory ministers of the day. Subsequent editors included Whitwell Elwin, Sir Wm. Smith (of dictionary fame), R. E. Prothero (afterwards Lord Ernle), Sir George Prothero, and Sir John Murray, who died in 1923 and was succeeded in the editorship by his son, the present Sir John Murray. It was in the pages of the *Q. R.* in 1831, that the party was first called 'Conservative,' and Lord Baldwin, when Prime Minister, once called it 'the godfather of the Conservative party.' It still continues its

literary and political career, but age has perhaps mellowed its auct. 'savage and tartary' methods which Byron said helped to kill Keats.

Quartermaster. In Brit. Army the officer in charge of all rations, supplies, and stores in a battalion or corresponding unit. He is not responsible for pay, weapons, or ammunition. In the navy a petty officer who is concerned with stowage, steering, soundings, etc., of the ship.

Quartermaster Corps.—In U.S. Army perform the same function as the Brit. R.A.S.C., R.E.M.E., and R.A.O.C. in so far as the last is not solely concerned with the supply and repair of weapons.

Quartermaster-General.—The senior administrative officer in charge of army supplies. The head of the 'Q' branch of the staff, who is represented at all headquarters, but whose deputy at lower level is also the deputy of the adjutant-general (q.v.).

Quarten, name used for the fourth part of certain Brit. measures. Thus a quarter of a pint in liquid measure and a quarter of a peck in dry measure are called a Q., as is also a 4-lb. loaf.

Quarter Sessions, see COUNTY SESSIONS; **SESSIONS OF THE PEACE, JUSTICES OF THE PEACE.**

Quarterstaff, stout pole from 6 to 8 ft. long and 1½ in. in diameter. It was grasped by one hand in the middle and by the other midway between the middle and end; it was much used in England by the peasantry as a weapon, and was manipulated by the movements of the lower hand.

Quartet, musical composition in four parts, vocal or instrumental, of which each part is essential. It originated with Haydn, was developed by Mozart and Beethoven; the latter perfected the art of part-writing. Qs. for stringed instruments are written generally in sonata form, and arranged for viola, violoncello, and two violins (string Q.), or for violin, viola, violoncello, and pianoforte (piano-forte Q.). Vocal Qs. are a great feature in opera and oratorio works written up to the time of Wagner.

Quarto: 1. Sheet of paper so folded as to make four leaves, or a book printed on paper so folded; usually abbreviated to 4to. The usual varieties are Crown Q. (10 by 7½ in.), Royal Q. (12½ by 10 in.), and Fool-cap Q. (8½ by 6½ in.). 2. In Portugal a liquid measure approximating to 3½ litres. 3. In Italy a dry measure, approximately just over 2 bushels.

Quartz (silica, silicic acid, SiO₂), most abundant mineral in the crust of the earth. It has a vitreous lustre, cannot be scratched with a knife, but scratches glass (h. = 7); it is insoluble in HCl, H₂SO₄, or HNO₃; it may be fused by the blowpipe, exhibits no cleavage, but chips easily with conchoidal fracture. No alteration is shown under the microscope, and it remains colourless except for liquid inclusions; refractive index low; polarisation tints pure but rather weak. Q. occurs as an ingredient of acid igneous rocks, such as granite, and of gneiss; being soluble in natural waters, it is found deposited in

veins in rocks, especially Archean and Palaeozoic; conglomerates and sandstones are usually chiefly composed of Q., and its crystals line most metamorphic lodes. The crystals are mostly hexagonal prisms terminated by hexagonal pyramids, being mostly combined growths of two or more simple crystals; when highly heated and allowed slowly to cool, they are oppositely electrified at alternate edges and corners. If a thin strip of crystal cut at right angles to the longitudinal axis is placed between vector prisms, the plane of polarisation is rotated. Q. occurs in three species. *Q. proper* (rock crystal, amethyst, rose Q., citrine, cairngorm, morion, occidental sapphire, occidental emerald, milky Q., prase, ferruginous Q.); *chalcedony* (chrysoprase, sard, carnelian, agate, onyx, sardonyx, cat's eye, plasma, flint); *jasper* (common, Egyptian, and ribbon; heliotrope and lydian stone). The colour varies with the impurities; blue, green, yellow, purple, pink, and brown; when good they are used instead of precious stones. Rock-crystal (sp. gr. 2.65–2.8) is used for vases and other ornaments and for spectacle glasses. Ornamental forms contain pyrites, silver, or gold, in spangles, needles, or leaves; or hair-like threads of hornblende, asbestos, iron oxide, or the oxides of titanium or manganese. Q. in the oxy-hydrogen flame can be drawn into threads of great tensile strength, 50 to 70 tons per sq. in. of section; these are used for torsion balances and galvanometers. They alter very little with heat and do not crack with sudden change of temp.; on account of this, fused Q. is a substitute for glass in some scientific instruments, such as thermometers. See also CAIRNGORM STONE.

Quartz Crystal Oscillators. Quartz is a mineral of crystalline structure and is found naturally in various parts of the world, especially in Brazil. When thin plates are cut along specific axes of a crystal they exhibit a piezo-electric effect (q.v.). This property is also possessed by the mineral tourmaline which is akin to quartz in its applications to radio communication. The piezo-electric effect becomes apparent when a quartz plate is placed in an electric field when it is found to undergo mechanical deformation. Conversely if the plate is compressed a potential difference will appear between its faces.

Like a tuning fork, the natural resonance frequency of a crystal plate depends upon its physical dimensions, and this property is utilised, for example, to control the frequency of a valve oscillator within fine limits. Due to its piezo-electric effect, the crystal behaves like a tuned circuit having a very sharp response and as such can, in a suitable oscillator, replace the usual inductance and condenser combination. Such an oscillator will run at a frequency determined by the controlling crystal which, because of its sharply tuned characteristic, can hold the frequency constant over wide ranges of other circuit variations.

Crystals having fundamental frequencies up to some 15 megacycles can be produced easily, and higher frequencies,

using tourmaline, have been made, but are expensive. Furthermore above this frequency the plate becomes extremely thin and fragile and its power handling capacity is very small. It is more customary therefore, when frequencies in excess of 15 megacycles are needed, to employ a low frequency crystal oscillator followed by multiplier stages.

Plates of quartz can be cut from the parent crystal in sev. ways which are

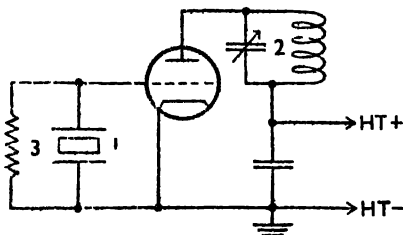


DIAGRAM OF SIMPLE CRYSTAL CONTROLLED OSCILLATOR CIRCUIT USING TRIODE VALVE
1, crystal plate, 2, circuit tuned to output frequency, 3, grid leak providing bias.

usually referred to four axes mutually at right angles, namely, X, Y, and Z where the last named is along the length of the crystal. Simple plates are often referred to as 'X cut' or 'Y cut.' Plates can be cut at angles to these main axes, having improved performance in output and temp. coefficient, and such cuts as 'AT,' 'BT,' 'CT,' etc., are made, each accentuating some particular property. 'AT' cut plates, for example, possess a better temp. coefficient and greater harmonic output than either 'X' or 'Y' cut.

Since crystals can be used to simulate electrical tuned circuits of both parallel and series types they have another important application in electric filter design. Their sharp response enables filter circuits to be included in the intermediate frequency (I.F.) amplifiers or communications receivers to give responses of as narrow as a few cycles. In multi-channel carrier telephony crystal filters are widely used and they can be employed as electro-mechanical transducers for supersonic work and echo-sounders.

Quartz Glass, or silica glass, is fused quartz that has been allowed to cool to a vitreous, amorphous mass. It is widely used for gas globes, scientific apparatus, etc., since it has a small coefficient of expansion and may therefore be quickly heated or cooled without breaking. Unlike ordinary glass, it is transparent to the ultra-violet rays. The pioneer in its use was W. A. Shonstone, F.R.S.

Quartz Porphyry, see PORPHYRY.

Quartz Rock, or **Quartzite,** metamorphic rock of sedimentary origin, found most abundantly in the oldest geological strata. It forms int. masses, and then shows evidence of crushing and recrystallisation. As *quartz schist* it exhibits a foliated

structure. It is white, grey, yellow, or red; largely found as an infiltrated constituent of sandstone; felspar, mica, chlorite, and iron oxide are often its impurities. It is resistant to weathering, hard, smooth, and vitreous, insoluble in acids, and exhibits a splintery fracture. Under the microscope the grains show apparent fusion, but the structure is crystalline, and rock-crystals are often developed in it. In veins it is usually metalliferous, containing pyrites and gold.

Quasimodo Sunday, see LOW SUNDAY.

Quassia, name given to two distinct species of tree. *Q. amara* is a native of Guiana, with curious winged stalks to the leaves and large terminal racemes of bright scarlet flowers, sometimes grown in the stovehouse. The Jamaica *Q. (Picramnia excelsa)* yields 'Q. chips,' extracts of which have medicinal uses.

Quaternary, or **Post-tertiary,** geological period from the Tertiary to the present day. It consists of the Pleistocene, containing many extinct mammals, and the Recent, with only a few, both divisions being characterised by molluscs not yet extinct. The deposits are sand and shingle, alluvium, river gravels, brickearth, and clay-with-flints. The ice sheet (see GLACIAL PERIOD) extended S. to mid Europe and mid N. America, driving before it animals and plants, so that just N. of the Mediterranean there existed Tundra (*q.v.*), there were successive glacial advances and retreats, and the ice then retreated gradually to its present position, the climate becoming milder. The evidence beyond fossils include moraines, raised beaches, erratic blocks, sands and gravels with lacustrine deposits, boulder clay or till, polished or striated rocks, and particularly by the skeletal remains, tools, and art of early man. In Britain the correlation of human cultures and the glacial phenomena has received much attention by archaeologists who have based their work on researches undertaken in Sweden, the Alps, France and Spain.

Quaternions. The subject is difficult to explain in a short article and the brief exposition which follows must be regarded as a mere outline of a few of the more elementary principles. Starting with a vector, this can be defined as the representative of transference through a given distance in a given direction, and the transference from *A* to *B* is represented by *a*, the transference from *B* to *A* is represented by $-a$. If the line *AB* is taken as *a* units in length the unit vector along *AB* being denoted by *a*, the vector along *AB* is *aa*, and the length of the line is termed the *tensor* of the vector—a name given to it by Sir Wm. Rowan Hamilton, the founder of the science of *Q.* more than a century ago. By means of vector addition and subtraction many geometrical problems are easily solved without depending on previous propositions, as in Euclid's *Elements of Geometry*. The subject becomes more complicated when we deal with vector multiplication and div. By the term 'multiplying into' is meant that the first written symbol in a sequence is the operator and the second is operated

on, so that $\alpha\beta$ denotes the result of α operating on β . To explain this symbolism take two axes Ox and Oy at right angles to each other, Ox being drawn to the right and Oy vertically upwards, and imagine a third axis Oz drawn at right angles to the plane of the other two, that is, at right angles to the plane of the paper. Vectors measured in the directions Ox , Oy , Oz are positive, and those measured in the directions xO , yO , zO are negative. The usual convention about rotation is adopted, that is, it is positive if anti-clockwise and negative if clockwise. Hence the positive direction of rotation is from y to z , z to x , and x to y , and the negative direction is from z to y , x to z , and y to x . Let i , j , k be unit vectors along the axes Ox , Oy , Oz , respectively, then by definition i is the turning of j through a right angle in the plane perpendicular to i , so that $ij = -k$. In the same way $jk = -i$, and so on. The associative law of multiplication is retained, that is, it is indifferent in what way operations are grouped so long as the order remains unchanged, so that $ijk = -1$, etc. The commutative law of multiplication assumed in ordinary algebra is inapplicable, so that ij is not the same as ji . Actually $ij = -k$ but $ji = +k$, so that $ij = -ji$. From this it is easy to deduce the following: $i^2 = ii = j^2 = -1$. But $ij = -k$, and hence $i^2 = -1$, or the square of unit vector along Ox (and as Ox may have any direction it is possible to generalise) or along any direction is -1 . This simply informs us that the repetition of turning through a right angle reverses a vector. From the preceding the following are obvious:

$$\begin{aligned} ij &= k = -ji & ki &= j = -ik \\ jk &= i = -kj & ii &= jj = kk = -1 \end{aligned}$$

In the case of vectors which are not at right angles let OA and OB be unit vectors α and β respectively, and let the angle AOB be θ . Let ϵ be unit vector perpendicular to the plane BOA , then it can be shown that $\alpha\beta = -\cos\theta + \epsilon\sin\theta$ and also that $\beta\alpha = \cos\theta + \epsilon\sin\theta$. If α and β are not unit vectors but contain T_α and T_β units, respectively, the above expressions become $\alpha\beta = T_\alpha T_\beta (-\cos\theta + \epsilon\sin\theta)$ and $\beta\alpha = \frac{T_\beta}{T_\alpha} (\cos\theta + \epsilon\sin\theta)$. The product or quotient of two vectors α and β is seen to consist of two parts—a numerical quantity $-T_\alpha T_\beta \cos\theta$ or $\frac{T_\beta}{T_\alpha} (\cos\theta)$, and a vector portion, $T_\alpha T_\beta \epsilon \sin\theta$, or $\frac{T_\beta}{T_\alpha} \epsilon \sin\theta$. Hamilton called the first of these the scalar part and the latter the vector part. $\beta\alpha$ or $\cos\theta + \epsilon\sin\theta$ as an operator turns α through the angle θ and is known as the versor through the angle θ . If θ is 90° it is obvious that results similar to those obtained previously for vectors at right angles follow. The method of Q. is of great value in geometrical and dynamical problems, and has in part come into general use among physicists and in the problems of engineering. See Sir

W. R. Hamilton, *Lectures on Quaternions*, 1853; E. B. Wilson, *Vector Analysis*, 1901 (expansion of *The Elements of Vector Analysis*, by J. W. Gibbs); P. Kelland and P. G. Tait, *Introduction to Quaternions*, 1904; and J. B. Shaw, *Vector Calculus*, 1922.

Quatorzain, poem of fourteen rhymed iambic pentameters, divided into three quatrains of alternate rhymes, and ending with a rhymed couplet.

Quatrain, four rhymed lines which may be of any length, but linked by a unity of thought, as, for example, in an epigram, for which the Q. is often used.

Quatre-Bras, vill. of Belgium in S. Brabant, situated about 10 m. from Waterloo. It was the scene of a battle on June 16, 1815, between the Brit. under Wellington and the Fr. under Ney, when the latter was repulsed. Simultaneously Napoleon was attacking Blücher at Ligny as part of the plan to separate and destroy in detail the allied Brit. and Prussian forces. A bronze lion was erected here to the memory of the duke of Brunswick in 1890.

Quatrefages de Bréau, Jean Louis Armand de (1810-92), Fr. naturalist, b. at Berthezene (Gard), the son of a farmer. Having taken his M.D. and D.Sc. degrees at Strasbourg, he accepted, in 1833, the chair of zoology at Toulouse, but in 1840 was drawn to Paris, where he eked out a livelihood by illustration and also by writing articles, as, for example, that 'sur les caractères zoologiques des rongeurs,' for the *Revue des deux mondes*. In 1855, after lecturing for five years at the Lycée Napoléon, he was appointed to the chair of anatomy and ethnology at the Musée d'Histoire Naturelle. Among his scientific pub. may be cited his *Charles Darwin et ses précurseurs français* (1870), in which he opposes the evolutionists; *Crania ethnica* (1875-82), in which Dr. Hamy was his collaborator; and *Histoire générale des races humaines* (1886-89), a valuable contribution to anthropology. Eng. trans. of his works include *Metamorphoses of Man and the Lower Animals* (1864); *The Prussian Race* (1872); *The Human Species* (1879); and *The Pygmies* (1895).

Quatrefoil, in architecture an ornament used in tracery, etc., consisting of four leaves somewhat similar to the four-leaved clover. It is also used in heraldry.

Quattrocento (It. 400, contraction for 1400, cf. Cinquecento), term applied to the It. literature and art of the fifteenth century. Artists of that period, who are called Quattrocentists, include Donatello, Ghirlandajo, Brunelleschi, and Fra Lippo Lippi.

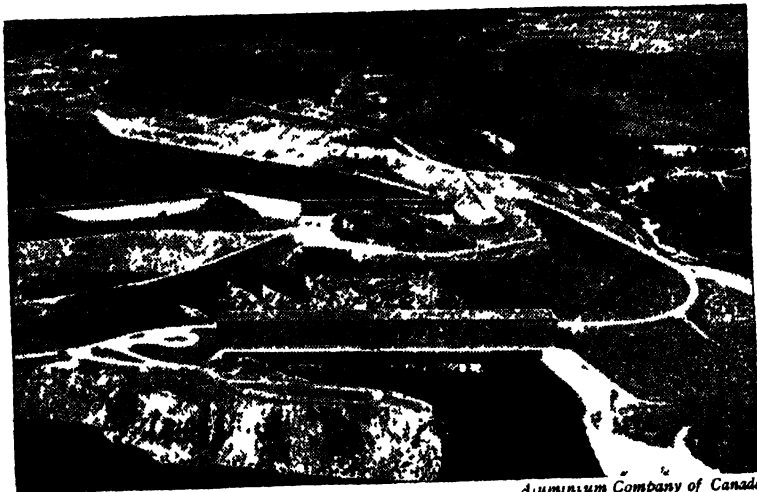
Quaver, musical note and measure of time, equal to half a crochet or the eighth of a semibreve. In time-signatures it is symbolised by the figure 8: e.g. 3-8 indicates bar-lengths of three Qs.

Queanbeyan, tn. of New S. Wales, Australia, in Murray co., situated on the Murrumbidgee R., 55 m. S.W. by S. of Goulburn. It is the centre of an agric. and mining dist., producing copper, lead, iron, silver, gold, etc., Pop. 5000.

Quebec, the largest prov. of Canada,

bounded on the N. by Hudson Strait (the boundary was extended in 1912 so as to include the dist. of Ungava), on the W. by the R. Ottawa, and on the S. by the U.S.A. and New Brunswick. From 1535 to 1763 it was known as New France or Canada; until 1790 as the prov. of Q.; until 1846 as Lower Canada; and in 1867 became once more known as the prov. of Q. On the E. the prov. has a coastline of 825 m. on the Atlantic, and covers in its northward extension from the St. Lawrence and Ottawa Rs. to Labrador and the Hudson Strait over 17° of lat. and an area (as amended by the Labrador Boundary

prin. are the St. John, the Mistassini, and the Abitibi on the N., and the Temiscouata, the Memphremagog, and the Mégantic on the S. of the St. Lawrence. The climate is more severe than that of Ontario, but owing to the dryness of the air it is unquestionably healthy, and has been found beneficial for consumptives; There are two sanatoria for consumption, one at St. Agathe, the other at Lake Edward. The soil is very rich, and the prin. crops grown include wheat, barley, oats, rye, maize, potatoes, hay, clover, turnips, beet, and alfalfa; grapes, tomatoes, apples, plums, and other fruits



Aluminium Company of Canada

SHI'NSHAW, SAGUENAY RIVER, QUEBEC: THE GREATEST HYDRO-ELECTRIC DEVELOPMENT IN CANADA

No. 2 powerhouse and headblock, 875 feet long, houses twelve generators with a total capacity of 1,200,000 h.p.

Award) of 591,960 sq. m. (523,860 sq. m. land and 71,000 sq. m. water). Of this area 351,760 sq. m. represent the ter. of Ungava, annexed under the Quebec Boundaries Extension Act, 1912. Anticosti and the Magdalen Isles in the gulf of St. Lawrence are attached to Q. The surface of the prov. is diversified: there are vast stretches of forest, many rivers and lakes, and much agric. land. Q. belongs almost entirely to the basin of the St. Lawrence; the two prin. ranges of mts. run parallel with the course of the riv., S.W. to N.E., the Notre Dame Mts. being on the S. and the Laurentian Mts. on the N. In addition to the St. Lawrence itself, the prin. rivs. are its tribs., the Ottawa (forming for much of its course the boundary between Ontario and Q.), the St. Maurice, and the Saguenay on the l. b., and the Richelieu, the St. Francis, and the Chaudière on the r. b. There are a large number of lakes, of which the

are also grown, especially in the E. Most farmers own their farms, and the outstanding crops grown are hay, oats, and potatoes. In 1947 the total area under cultivation was 6,390,100 ac., and the value of the crops was \$162,410,000. Throughout the prov. mixed farming is a general practice. The rearing of livestock is also carried on, and the raising of beef cattle is a business of considerable importance in the E. townships. Dairying is one of the most important industries, dairy products being valued at \$153,651,000. The butter of Q. is internationally renowned for its flavour; the value of agric. capital in 1942 was \$1,148,000,000. The fisheries of the prov. are very important, especially along the St. Lawrence; their value in 1942 was \$4,194,000 (the total for the dominion being \$75,000,000). The prin. fish are cod, mackerel, lobsters, and salmon. The mineral deposits of Q., particularly those of asbestos, have long been

known for their quality and extent, while deposits of copper, gold, and zinc have been developed in Rouyn and the neighbouring townships in the W. part of the prov. In 1946 a titanium ore deposit was discovered on the shores of Lake Tio. The asbestos deposits, which, geologically stated, occur in altered peridotite in S.E. Q., are the most productive in the world. The most important deposits are those at Black Lake, Thetford, Robertsonville, E. Broughton, and Danville. Numerous plants manufacture asbestos products, including asbestos paper and millboard, roofing and building materials, pipe insulation and insulating sheets and blocks, and packing for steam, oil, and hydraulic operations. In 1946 asbestos production (\$24,291,000) reached its peak and exceeded that of gold (\$21,544,000) in value for the first time since 1930. The prov. offers an attractive diversity of geological formation, including the Keweenaw, Laurentian (see LAURENTIAN ROCKS), and Huronian, containing, besides asbestos and copper, gold, silver, lead, nickel, iron, zinc, phosphate, mica, and granite. There are many millions of tons of iron magnetite sands containing a high percentage of iron, along the N. shore of the St. Lawrence at Morin, Mingan, Natashquan, and other places in Saguenay co. There are a number of bog iron ore deposits in the St. Lawrence valley, remarkably free from sulphur and phosphorus, and iron ore deposits also exist along the Gatineau R. in Hull township, near Ottawa. The value of mineral production in 1946 and 1947 was \$92,213,636 and \$110,627,000 respectively. There are over 264,000 sq. m. of forests (including forests leased, 78,000 sq. m., timber lands not leased, 15,000 sq. m., freehold forest, 26,600 sq. m., township forest reserves, 2700 sq. m., wood lots under location tickets, 1000 sq. m.). The forest service of the Dept. of Lands and Forests administers the lumber lands but forest protection is under a separate organization. Q. produces more than half of the Canadian output of pulp and paper. In 1947 over 3,750,000 tons of pulp and 3,099,000 tons of paper were produced, gross value \$346,120,000. There were 1768 fur farms in Q. in 1946, fur production for 1946-47 being valued at nearly \$4,000,000. Water power is very important turbine installations producing over 5,800,000 h.p. in 1948. In 1944 the most important plants and distribution systems were taken over by the Q. Hydro electric commission.

There are two distinct systems of education in Q., in each of which religion occupies a prominent position, viz. the Protestant and the Roman Catholic systems. In the former the curriculum and the general system of education are similar to those in the other provs., except that the highest grade is Grade XII, from which students are matriculated to McGill Univ. and Bishop's College, the two Protestant English-speaking univs. In the Roman Catholic schools, mainly French-speaking, the administration is in the hands of the Catholic Committee of the Council of

Public Instruction, under a French secretary. There are four univs., McGill Univ. (Montreal), founded in 1821, and Bishop's College (Lennoxville), both Protestant; Laval Univ. (Q. city), founded in 1852, and Montreal Univ., opened in 1876 as a branch of Laval and granted autonomy in 1919. The Polytechnic School of Montreal was founded in 1873. The Protestant univs. have over 9700 students and the Catholic over 20,000. Secondary education is given in forty-two classical colleges for Catholics, and in three colleges for modern secondary education, with over 17,000 students. The high schools of both denominations are included with primary education. The primary schools include 8800 Catholic schools (543,000 pupils) and 534 Protestant schools (67,000 pupils). The entire primary school organization in Q. is under the immediate control of the superintendent of public education, who is under the prov. secretary. More attention is given to-day to education that has a direct bearing on industry and commerce. The ordinary schools, those for primary, secondary, and superior education, are augmented by a number of special schools for giving instruction in agriculture, forestry, household science, domestic handicrafts, furniture-making, graphic arts (textiles, social service, music, and dramatic art). These come under a dept. of social welfare and youth, recently created to supervise social policies and to aid youth in preparing for its future by means of technical education. Large gov. grants are made to technical schools in Montreal, Quebec city, Three Rivers, Hull, Lacune, Sherbrooke, Shawinigan Falls, and Beauportville, so that scientific and practical training may be given to apprentices, journeymen, foremen, clerks, salesmen and others following an industrial and commercial life. These special schools mark a departure from the concentration on classical education which for long dominated education in Q. and they reflect also a response to changing social and economic conditions among which not the least important is the increase of the prov.'s industrial pct. during the Second World War by the requirements of labour in factories in Montreal Q. city, and other cities.

Q. shared in the remarkable manufacturing progress of Canada after the First World War, including sugar, mineral and manufactured products. The pulp and paper mills are the most important manufacturing unit in the prov. Steel and lumber production is increasing, as also is the output of textile, stock clothing and furniture factories. The industrial structure, long based on half a dozen main industries, has been enlarged to include the manufacture of many new products. Next to pulp and paper the leading industries are non-ferrous metal smelting and refining, chemical products, cotton yarn and cloth, clothing, railroad rolling stock, shipbuilding, electrical apparatus, brass and copper goods, aircraft, butter and cheese, meat packing, cigars and cigarettes and machinery. The pulp and

are the cap., Q. (for which see separate article), pop. 150,700; Montreal, the commercial metropolis, 903,000; Verdun, 67,300; Three Rivers, 42,000; Sherbrooke, 36,000; Hull, 33,000. The prov. gov. is in the hands of a lieutenant-governor, assisted by a legislative council of twenty-four members appointed for life, and a legislative assembly of ninety-two members elected for five years; twenty-four senators and sixty-five members of the House of Commons represent the prov. in the Dominion Parliament. Women were enfranchised in 1940. The pop. in 1941 was 3,331,882 (estimated pop. in 1948, 3,792,000), of which the majority were of Fr. descent (Brit. born, 91,900). According to religious beliefs 2,894,600 were Rom. Catholics; 162,000 Anglicans; 100,000 United Church; 65,700 Jews. For hist. and details of gov. of the prov., see CANADA.

See B. Willson, *Quebec, the Laurentian Province*, 1913; J. C. Sutherland, *The Province of Quebec*, 1932; A. L. Burt, *The Old Province of Quebec*, 1934; R. Runcilly, *Histoire de la province de Québec* (16 vols), 1940-45; W. P. Percival, *The Lure of Quebec*, 1941; E. C. Hughes, *French Canada in Transition*, 1943; S. B. Ryerson, *French Canada*, 1914; and gov. reports. See also CANADA, Bibliography.

Quebec (Quebec City), the cap. of the prov. of that name, and formerly cap. of Canada, is situated on the l. b. of the St. Lawrence, at the mouth of the St. Charles R., 180 m. N.E. of Montreal. It is picturesque situated, occupying a promontory between the two rvs., its citadel crowning the precipitous front of Cape Diamond, and is divided into two sections, an upper and a lower tn., the upper built entirely on the cliff, the lower spread out on the littoral surrounding Cape Diamond and up the valley of the St. Charles R. The former is the residential, the latter the business portion of the city. The lower tn. is characterised by winding, steep, and narrow streets where may still be seen the strong stone houses built before the time of Wolfe. Q. occupies the most important military position in Canada and its citadel has been termed the Gibraltar of Canada. By the beauty and number of its monuments and sites, by its old houses of an archaic style of architecture, by the absence of order in the planning of its ensemble, which lends it the appearance of some of the oldest cities of Europe, the city of Q., more than any other in America, has kept its old Fr. aspect and remained a paradox for the lovers of hist. and poetry. To the S.W. are situated the Plains of Abraham, where a monument has been erected to Gen. Wolfe. The Plains of Abraham are situated in what is called the National Battlefields Park, which also comprises Avenue des Braves and the Park of Sainte Foy where Lévis defeated Murray in 1760. Also situated to the S.W. is Wolfe's Cove, where tradition says that Wolfe landed his troops in 1759 to take Montcalm by surprise. Among other historic sites are Montmorency Park, at the top of Mountain Hill, which occupies the site

of the first Canadian Parliament, where the Pact of Confederation was signed in 1867; the Seminary Gardens, enclosing the site of the dwelling of Guillaume Couillard, son-in-law of Louis Hébert, the reputed first settler of Canada; and Dufferin Terrace covering the site of Château St. Louis, the corner-stone of which was laid by Champlain in 1620. The château, in which Champlain died in 1635, was destroyed by fire in 1834. Among the existing houses dating from the Fr. regime and the first years of Eng. rule are the Kent House, built in 1630 by Governor d'Alleboust; the Montcalm House, 1677 (erroneously believed to have been the scene of Montcalm's death); Montcalm's residence, situated on the ramparts and built in 1737, and occupied by Montcalm in 1758-59; the Judge Sewell House (1803); the Valois House (1818); and the Garrison Club (1820) in St. Louis Street. The fine Prov. Parliament Buildings are situated in extensive grounds, and among other noteworthy buildings are the city hall, court house, the imposing palace of the Rom. Catholic cardinal, the Rom. Catholic and American cathedrals, the custom house, church hall, and the Ursuline Convent. The oldest church in the city is the Basilica of Notre Dame, which was built first in 1647, destroyed by fire and rebuilt thrice. After the fire of 1922 the architects took their inspiration for its remodelling from the Renaissance and Corinthian styles. Notre Dame des Victoires was built in 1688 and 1699, after the defeat of Philip, named Notre Dame de la Victoire; in 1711, after the defeat of Walker's fleet, it received its present name. It contains some very fine paintings and many memorial tablets. Another noted feature is the famous shrine of Ste. Anne de Beaupré close by the city. The educational institutions are Laval Univ., the Q. Seminary, and the Q. High School, whilst there are many benevolent and charitable institutions. The city is the seat of a cardinal archbishop and an Anglican bishop. Q.'s many monuments to the memory of discoverers, warriors, prelates, and statesmen include the Champlain (1898) which is on Dufferin Terrace, by Paul Chevré and Paul de Carondelet (both of Paris); the Wolfe-Montcalm obelisk in the du Fort Garden; the Laval, in front of the post office, erected in 1908 to the memory of Q.'s first bishop, and done by Philippe Hébert; the Cartier, in Montmorency Park (1920), by G. W. Hill; the Cardinal Taschereau, in the Basilica Square, by Vernare and Roisin (both of Paris), erected in 1923 to the memory of Canada's first cardinal; and the Cross of Sacrifice, near St. Louis Gate, erected in 1925 to the memory of the soldiers who fell in the First World War. A few miles above the city the Q. Bridge, a wonderful engineering feat, spans the St. Lawrence. The bridge, of the cantilever type with suspended central span, has a total length of 3239 ft., the central span being 640 ft. The cantilever arms extend out over the water a distance of 1160 ft.;

the total width is 88 ft., taken up by two railway tracks, two footpaths, and a roadway, opened Sept. 22, 1929, for the accommodation of motor and horse-drawn traffic.

Electrical power is provided by the Montmorency Falls, a few miles distant, as well as by the vast Isle Maligne plant at the head of the Saguenay R. The prin. manufs. are iron, steel, and leather goods, clothing, boots and shoes, paper, tobacco, wooden ware, biscuits, etc., whilst timber is largely exported. Q. has one of the largest dry docks in the world. It is a noted centre for the export of lumber and also of wheat. The deepening of the St. Lawrence to Montreal has retarded the growth of shipping at Q., but the commerce of the city is considerable. In 1944 the total net registered tonnage of vessels entered at Q. was 1,774,697. The railway communication inland is good, and Q. is the head of ocean steamship navigation to Europe. It sends three members to the Legislative Assembly of the prov., and three to the Dominion House of Commons. Before the arrival in Canada of any European explorers, the Indians had chosen this exceptional site for the construction of an entrenched camp, which was visited by Champlain a few years before he founded Q. in 1608. Q. was captured by the Eng. in 1629 and again in 1759 and finally ceded to England in 1763. Pop. 150,700. See A. G. Doughty, *The King's Book of Quebec* (memorial vols. of tercentenary celebrations of July 1908), 1911; M. J. Pelton, *Natural Resources of Quebec*, 1923; W. Bovey, *Canadians*, 1933; and R. Traquair, *Old Architecture of Quebec*, 1947.

Quebec Act, 1774, Act of the Brit. Parliament 'to make more effectual provision for the government of the province of Quebec,' in effect of Canada. It extended the prov. boundaries of Quebec on Canada to include all the Old Northwest, which comprised the ters. bounded by the Ohio and Mississippi Rs. and the S. boundary of the ters. granted to the Hudson's Bay Company. In 1670, it substituted the Fr. civil code for the Eng. civil law, it gave freedom of worship to the Rom. Catholic Church in Canada and, in effect, endowed it by ordaining that the Rom. Catholic clergy should continue to receive their accustomed dues and rights.' But it made no provision for calling a 'legislative assembly,' deeming it expedient to continue government by governor and council. The granting of part of the W. ter. to Quebec and the recognition of the Rom. Catholic religion greatly angered the Amer. colonies, but the Act kept the Fr.-Canadians from making common cause with the Amers. in the Amer. War of Independence. The motives for this legislation are not clearly estab.; some historians think that the purpose of the Act was essentially military, but others think that it was inspired by the same liberal policies as have conduced to the steady evolution of the Brit. Commonwealth of Nations. The Act is still cherished by the Fr.-Canadians as the

charter of their liberties. See R. Coupland, *The Quebec Act: a Study in Statesmanship*, 1926; H. Metzger, *The Quebec Act: a Primary Cause of the American Revolution*, 1936; and A. L. Burt, *A Short History of Canada for Americans*, 1942.

Quebec Marmot, see under MARMOT.

Quebracho, S. Amer. tree of the family Apocynaceae. From the bark is made white Q., a drug used for dyspepsia, bronchitis, and phthisis.

Quecha Language, see under SOUTH AMERICAN NATIVE LANGUAGES, *Caribbean Area*.

Quechuas, see QUICHUAS.

Quesad, see KEDAH.

Quedlinburg, tn. of Saxony-Anhalt, Germany, 56 m. S.E. of Brunswick, near the N.W. base of the Harz Mts. A horticultural centre, with a trade in vegetables and seeds. There are manufs. of iron, brass, and cloth goods. Q. was founded as a fortress by Henry the Fowler about the year 924. His tomb, and that of his wife Matilda, are in the anc. Schlosskirche (dedicated in 1129). The old tn., with its turreted wall, recalls the days when Q. belonged to the Hanseatic League, whilst a new city with four suburbs represents the industrial activities of to-day. It is the native place of both Klopstock (b. 1724) and Karl Rattler (b. 1779). Pop. 28,200.

Queen, see KING, SOVEREIGNTY.

Queen Alexandra's Imperial Military Nursing Service, see MILITARY NURSING.

Queen Anne's Bounty, see BOUNTY, QUEEN ANNE'S.

Queenborough, bor. of Kent, England, situated on the R. Swale, Isle of Sheppey. It is a deep-water port importing coal and exporting manufactured goods. Here the copperas factory was first estab. in England. There are pottery, chemical, and glue works. Q. has thirteen royal charters, the first dated 1369. Pop. 3200.

Queen Charlotte Islands, archipelago in the N. Pacific, off the N.W. coast of Brit. Columbia. Canada, from which it is separated by Hecate Strait on the E. and Dixon entrance on the N. A Brit. dependency, it consists of two or three large is., Graham Is., Moresby Is., and Kunghit. The first two measure with North and Prevost 180 m. in length and 60 m. at the greatest width. Lying in lat. 52° to 54°, long. 132° to 134°, they were discovered by James Cook in 1778. In 1787 Capt. George Dixon, R.N., explored the is. and named them after his ship, *Queen Charlotte*. Two years later Gray named them in Washington, and that is how they are marked on Ingraham's chart of 1791, but the first name has survived. Juan Perez had landed on them in 1774 and named the N. point Cabo de Santa Margarita. The inhab. are known as Haida and number some 5000. Minerals are known to exist. The people are chiefly engaged in agriculture (especially the cultivation of potatoes), fishing and game hunting, and lumbering. There is another group of is. known as Q. C. in the S. Pacific Ocean, which were discovered by Capt. Carteret. See F. Poole, *Queen Charlotte Islands*, 1872.

Queen Charlotte Sound, strait in the N. Pacific Ocean, dividing Vancouver Is. from the mainland and forming the first of a series of inlets along the N. and E. of the Is.

Queen Consort, see **CONSORT**.

'Queen Elizabeth', former Brit. battleship, launched Oct. 1913. It was the first battleship to dispense entirely with coal and to use oil alone; 600 ft. long, 27,500 tons displacement; speed, 25 knots; turbines, 60,000 h.p.; guns, eight 15-in., firing a shell weighing nearly 2000 lb., and sixteen 6-in. When during the First World War the idea of attacking Turkey via the Dardanelles was being considered, it was thought that the guns of the *Q. E.* would be more than a match for the forts; but this proved to be erroneous, as some of the forts were so constructed that she could not reach them without exposing herself. After doing some good work she was recalled to England. In the early years of the Second World War the *Q. E.* served in the Mediterranean, and was sunk in Dec. 1941 by U-boat mines attached by it. 'frogmen.' She was raised and repaired, to become the Mediterranean fleet flagship, and in 1945 served off Burma as flagship of the E. Indies fleet. In 1948 the *Q. E.* was scrapped.

'Queen Elizabeth' (liner), see under **CUNARD STEAMSHIP LINE**.

Queen Margaret College, Glasgow, was given over to the Univ. of Glasgow in 1892, but in 1893 the college was dissolved. The name *Q. M. C.* remains as the designation of the women's dept. of the Univ.

'Queen Mary', former Brit. battle-cruiser of *Lion* type; built by Palmers of Jarrow; launched in 1912; displacement 27,000 tons; eight 13.5-in. and sixteen 4-in. guns. Just before the battle of Jutland (*q.v.*) she was at Rosyth as a unit of the 1st B.C. Squadron under Adm. Sir David Beatty. In the early stages of the battle she was hit by a salvo from the Ger. battle-cruiser *Derfflinger* which caused an explosion from which she sank.

'Queen Mary' (liner), see under **CUNARD STEAMSHIP LINE**.

Queen Mary Land, region of Antarctica, E. of Kaiser Wilhelm II. Land, extending from 91° E. to 102° E., where it joins Wilkes Land. It was discovered and its coastline charted by the Australasian Antarctic expedition of 1911-12 under Sir Douglas Mawson (*q.v.*). The W. coastal party of this expedition, when travelling from Mt. Gauss to Haswell Is., 100 m. eastward, had to ascend to an elevation of 2580 ft. in long. 91° 30' E., and therefore this stretch of coast appears to be unapproachable from landward. From Cape Meliner 68° 32' S. lat. and 91° 50' E. the coast trends eastward for nearly 50 m. to Helen glacier. The bight lying westward of this glacier is named Wright Bay. Haswell Is. is remarkable for its wonderful bird life, almost all varieties of Antarctic birds being found. Near the Is. is the largest Emperor penguin rookery known to exist. Denman glacier, flowing into the S.E. side of Robinson Bay, is a major Antarctic glacier, its main

channel being 9 in. wide. Its final descent to sea level is by way of a huge ice-cascade, at the base of which it reforms and presses through Shackleton shelf ice. The latter is an immense shelf of ice fronting the coast for over 160 m. eastwards from Junction Corner (the point where the W. side of the shelf meets the land ice-cap). Westward of Shackleton shelf ice and southward of the pack-ice belt, the Mawson expedition found open water during the summer months. This area was named Davis Sea, after a member of the Mawson expedition commanding the *Aurora*. The mainland S. of the shelf ice rises to about 3000 ft. and is entirely ice-covered. Another large glacier is the Northcliffe, which flows into the S.W. side of Robinson Bay. On the S. side of this bay, at a spot 200 ft. above the surface of the Northcliffe glacier, Wild (see under **SHACKLETON**) took possession of *Q. M. L.* for the Brit. Crown on Dec. 25, 1912. Among other is. off the mainland are Masson, Henderson, David, Bowman (700 ft., discovered in 1931 by the Brit., Australian, and New Zealand expedition), Mill (discovered in 1936 by the research ship *William Scoresby* (see **DISCOVERY COMMITTEE**), and Drygalski (44 m. N. of Haswell Is., 1200 ft. above sea level and about 9 m. in diameter). See *The Antarctic Pilot* (Hydrographic Dept., Admiralty), 1948.

Queen Mary's Army Auxiliary Corps. The name given to a corps of women war workers formed in 1917 by the Army Council, when man-power was becoming seriously reduced, to provide women substitutes for certain male workers in units and offices administered by the Army Council at home and at the bases and on the lines of communication. They wore khaki uniform, and the number of officials and members enrolled was about 45,000, of whom 17,000 served in France and Flanders, while others were employed in Salonika, Italy, and Ireland. The corps, which was popularly known as the W.A.A.C.s, was disbanded early in 1920. Technically the corps was not under military discipline, and hence injuries received overseas were compensated for under a special Act. Some 300 awards were made to members of the corps for long service and devotion to duty. In the Second World War the Women's Auxiliary Military Corps was known as the Auxiliary Territorial Service (A.T.S.) (*q.v.*).

Queen Maud Land, region of ice and snow in Antarctica lying on the S.W. side of S. Georgia and claimed by Norway. Queen Maud Bay, which was named after the queen of Norway, is entered northward of Cape Nuñez, but the bay affords no anchorage. Between Cape Nuñez (lat. 54° 16' S. and long. 37° 25' W.) and Cape Disappointment the coast is little known. A small expedition of Brit., Norwegian, and Swedish scientists left for the region in the autumn of 1949. The idea of the expedition originated with Dr. H. Sverdrup, director of the Norwegian Polar Institute.

Queen-of-the-Meadows, see **MEADOW SWEET**.

Queens, bor. of New York city, covering an area of 11,739 sq. m. It was constituted in 1898, and the estimated pop. in 1940 was 1,297,600. It includes the former tns. of Jamaica, Flushing, New Town, and Long Island city. It has a number of libraries and schools.

Queensberry, Earls of. The title was bestowed upon Sir Wm. Douglas of Drumlanrig, Dumfriesshire, in 1633 by Charles I. This Douglas traced his descent from the Douglas who was slain at Otterburn. The third earl, whose name also was Wm., was an important personage in the hist. of Scotland during the latter half of the seventeenth century.

dukedom of Q. passed to his cousin Wm., earl of March. He became known as Old Q., and was a well-known character of the latter end of the eighteenth century. He was a great supporter of the turf and the opera, and was practically the founder of horse-racing. He died without legitimate issue, and his honours and titles passed to various members of his family. The duke of Buccleuch received the dukedom. Sir Charles Douglas became marquess of Q., and the title of earl of March passed to the earl of Wemyss.

Queensberry, John Sholto Douglas, eighth Marquess of (1844-1900), authority on the rules of the prize ring, of which



QUEENS' COLLEGE, CAMBRIDGE

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In 1680 he was lord chief justice of Scotland, and he was created in turn marquess (1682) and duke (1684). He did not share the Catholic sympathies of James II. with the result that two years before the revolution he was deprived of all his offices. His son the second duke, who was also created duke of Dover, joined William of Orange and fought for him in Scotland. He ultimately became the keeper of the privy seal. He was one of the king's commissioners to Scotland after the failure of the Darien scheme, and ultimately became one of the joint secretaries of state for Scotland. He was implicated in a Jacobite plot, and compelled to resign his offices, but in 1707 he resumed them, and after the union was practically the director of all Scottish affairs. He received, in addition to the dukedom of Dover, the titles of marquess of Beversley and earl of Ripon. His son, the third duke, married a daughter of the earl of Clarendon; but with his decease the Brit. title became extinct, and the

he was a great patron. He was the originator of the famous Q. rules which govern prize contests at the present time. See also WHITE, OSCAR.

Queensbury, part of the urb. dist. of Q. and Shelf in the W. Riding of Yorkshire, England, 4 m. N. of Halifax. Textiles are made; coal mined, and stone quarried. Pop. (with Shelf) 9000.

Queenscliff, seaside tn. and port in Victoria, Australia, situated on Port Phillip Bay.

Queens' College, Cambridge, was founded in 1448 by Margaret of Anjou, wife of Henry VI., and re-founded seventeen years later by Elizabeth Woodville (Woodville) wife of Edward IV. According to the present constitution the society consists of a president and eleven foundation fellows. The fellowships are tenable for six years from the date of election, and no fellow may hold a college living of which the net ann. value exceeds £400. A regular proportion of the college revenues is devoted each year to the scholarship fund. Famous

members include Bishop Fisher, Whitgift, and Erasmus.

Queen's College, Oxford, was founded in 1340 by Robert Eggesfield, chaplain to Philippa, queen of Edward III., after whom the college is named. Under the statutes of 1882, the college consists of a provost, from fourteen to sixteen fellows, about twenty-five scholars, and two Bible-clerks. Of the scholars, four or five, called Eggesfield scholars, are by preference to be natives of Cumberland, Yorkshire, or Westmorland. Robert Eggesfield was himself a native of Cumberland, and held the rectorate of Burgh in Westmorland. Famous members include Henry V., Wycherley, Addison, Bentham, and Pater. See R. H. Hodgkin, *Six Centuries of an Oxford College*, 1949.

Queen's College for Women, London, is situated at 43 Harley Street, W. Founded in 1848 and incorporated by royal charter in 1853, its object being the general education of women and the granting of certificates. Under the same management is the Queen's College School, to which boys are admitted up to the age of nine.

Queen's County, *see* LEIX.

Queensferry, royal burgh and coast tn. of vicinity, Scotland, situated on the firth of Forth, 8 m. N.W. of Edinburgh. At this point the ferry was formerly the prin. means of communication between Edinburgh and the N. of Scotland, and it is here there is the famous Forth Bridge. The harbour is good and always accessible. There are two piers, one on the E. and the other to the W. of the tn. The naval base of Port Edgar is at Q. There are large oil-works in the vicinity. Abercorn, to the W. of Q., was the site of an ant. monastery, and from 681 to 685 the see of the earliest bishopric in Scotland. Other buildings of note are a Carmelite priory and Dundas Castle. Pop. about 2500.

Queensferry, North, vil. of Scotland, in Fifeshire, situated on the Forth, at the end of the Forth Bridge. It is the N. side terminus of the ferry passage. It is noted as a bathing resort, and has whinstone quarries. Pop. 1200.

Queen's Hall, home of London's classical music for nearly fifty years, built by F. W. M. Ravenscroft on the site of property he owned in Langham Place, W., and opened on Nov. 27, 1893, with a concert by the Royal Amateur Orchestral Society. The best-known concerts held there were the 'promenade' concerts conducted by Sir Henry Wood and begun on Aug. 10, 1895. Nearly every musician of note appeared at one time or another on its platform. Here Richard Strauss introduced himself to London audiences, and here too Toscanini made his bow. In 1930, Paderewski was once paid a record fee of £1000 for a single orchestral-piano piece there. The Q. H. was hit by a Ger. bomb in 1941 and burnt out.

Queenshead, *see* QUEENSTOWN.

Queensland, N.E. state of the Commonwealth of Australia, situated between 10° 40' and 29° S. lat., and 138° and 153° 30' E. long.; it includes the adjacent

is. in the Pacific Ocean and in the gulf of Carpentaria. It is the second largest state of the Commonwealth, the area being 670,500 sq. m. Q. was included in the colony of New S. Wales from 1788 to 1859. The coastline, which is about 2250 m. in length and has many good harbours, is bordered by the Great Barrier Reef as far as 22° S. lat. The reef extends from near Port Curtis to the coast of New Guinea, and is impassable except through narrow channels, which are separated by considerable intervals. The reef has been investigated by a committee (the Great Barrier Reef Committee) at Brisbane, and reports have been issued.

Physical Features.—The surface of the country is fairly flat to the W. of the mts., the soil being very rich and eminently suited for pasturage. The Main Dividing Range is a coastal range of old rocks which runs N. and S. from New S. Wales to Cape Melville, being a continuation of the Australian Alps of Victoria and the Blue Mts. of New S. Wales; the highest peaks are Bellenden Ker (5500 ft.), near Cairns, Mt. Dalrymple (4250 ft.), and Mt. Lindsay (4046 ft.), whilst the average height of the range is 2000 ft. To the N. of Cape Melville the coastal range yields to a flat ridge capped with sandstone, which runs through Cape York Peninsula and gradually declines in elevation until it reaches Cape York. The great W. plain extends from the coastal range to the S. Australia border, and from New S. Wales to the gulf of Carpentaria. Two main watersheds of low elevation stretch from the coastal range westward; these include fertile riv. valleys covered with excellent soil. The rivs. which flow from the Dividing Range flow E. to the Pacific, N.W. to the gulf of Carpentaria, and W. to the interior. S. to the Murray-Darling system. From the southerly part of the coastal range flow the Albert, Brisbane, and Logan Rs., all emptying into Moreton Bay, the Burnett and Mary, which flow into Hervey Bay, and the Boyne into Port Curtis. The Darling Downs, lying W. of the range, are drained by the Condamine and its affluents; while the S.W. plains are drained by the affluents Maranoa, Warrego, and Paroo Rs., all flowing into the R. Darling. Northward of the more southerly watershed the Comet, Dawson, and Nogoa Rs. join the Mackenzie and Isaac Rs. and, flowing southward, form the northerly watershed, the Fitzroy, emptying into Keppel Bay. The Burdekin, the chief riv. of N. Q., flows southward, and after being joined by the Helyando and Sutor, empties into the Pacific near Cape Upstart by a mouth obstructed with sandbanks. Other rivs. further W. are the Barcoo, Diamantina, and Georgina, the latter two having their source in the Barkly Tableland. The Herbert, Johnstone, and Mulgrave Rs. rise from the E. slope of the N.E. coast range; the Gilbert, Lynd, and Palmer Rs. from the W. slope, flow into the gulf of Carpentaria. Yet further W. are the Norman, Flinders, Leichhardt, and Albert Rs., also flowing into the gulf of Carpentaria. None of the

rivs. is navigable for a great distance; those flowing into the gulf of Carpentaria are of little use to navigation at all, while those flowing into the interior are lost in the desert or its salt lakes.

Climate and Rainfall.—The climate of Q. presents great varieties, being tropical and sub-tropical, but on the whole very healthy. The summer heat is great, but is not aggravated by the hot winds found in other countries. The climate is regarded as effectual in checking pulmonary diseases. The rainy season extends from about Christmas time until March. The



Queensland Government

BARRON FALLS, CAIRNS RAILWAY, NORTH QUEENSLAND

precipitation on the E. coast amounts to as much as 135 in. a year at Innisfail, but is no more than 40 in. S. of Port Curtis. The average rainfall of the Darling Downs is about 35 in., and on the W. border about 8-9 in. Since 1893, when a hydraulic engineer's dept. was organised, the W. plains have everywhere been tapped by artesian wells, the waters of which are suitable for stock, irrigation, and household purposes in some cases; in others for only one or two of these purposes.

Fauna and Flora.—The fauna and flora of the state are typically Australian. The forests of Q. are extensive, eucalypti, pine, walnut, cedar, yellow-wood, silky oak, tulip-wood, and beech being grown.

Products.—The mineral wealth of Q. is great, and among the minerals found, though in varying quantities, are gold, silver, copper, coal, tin, lead, zinc,

limestone, opals and gems, arsenical pyrites, cobalt, fluorspar, and fireclay. The most important sources of gold are now those in Mt. Morgan, Crago (120 m. inland from Maryborough), Charters Towers, and Dittmar. Copper is found in Mt. Isa and Mt. Morgan. Ipswich is the main coalfield, followed by Bowen, Blair Athol, Callide, and Maryborough. Most of the tin is alluvial, the chief source being at Mt. Garnet, N. Q. Lead and zinc production increased with the development of Mt. Isa. Rutile-zircon-ilmenite (used for munitions and welding rods) is produced from beach deposits on the S.E. coast. Mineral production has always yielded the state a fairly large income. Since 1872, it had never been less than £1,000,000 a year. From 1905 to 1918 the value (excluding quarry products, £113,000 in value in 1913-14) reached over £4,000,000 in some years and was always at least £3,000,000. It then decreased for sev. years and commenced to improve from 1933, till in 1937 it approximated £4,000,000 as against £1,241,000 in 1930. From 1910 to 1912 the value exceeded £5,000,000, and over the five years ended 1914 £4,800,000. The average output and value of the chief minerals for the six years 1939-44 was as follows: gold, 82,000 oz., £1,022,500 (output and value have steadily declined, being only about one-third in 1944 of the output and value in 1939); coal, 1,509,000 tons, £1,839,000; copper, 8800 tons, £787,000 (showing a steady increase throughout); tin, 1000 tons, £203,500; silver, 2,877,000 oz., £299,000 (showing a steep decline in 1943-44); lead, average for 1939-42 42,500 tons, value £760,000; zinc, average for 1939-42 27,000 tons, value £470,000; rutile-zircon-ilmenite, 14,000 oz. in 1914, valued at £124,000.

The land between the coast range and the ocean is, generally, very fertile. It was formerly covered with jungle or rain-forest, locally termed 'scrub.' Large tracts, however, are mere waste. Westward of the coast range the state land is open forest country or downs very suitable for wool-growing. Here, the rainfall being adequate, cattle are pastured in large numbers. The introduction of prickly pear into Australia in 1788 and 1824 has notoriously proved to be disastrous to the Commonwealth, and to no state more than Q., but happily the unremitting efforts of biologists have resulted in counteractive measures which have won back large areas to cultivation, the most promising destructive agents being the *cactoblastis* (genus of pyralid moth) and the *coccinella* ('wild cochineal'). The prin. crops are sugar-cane, maize, wheat, sorghum, green forage, hay, peanuts, potatoes, pumpkins, tobacco, orchard fruit (apples, peaches, apricots, custard apples, plums, etc.), plantation fruit (bananas, papaws, pine-apples), vegetables (beans, tomatoes, etc.). The production of sugar-cane is the leading feature of Q. agriculture and it occupies most of the riv. flats and fertile valleys near the coast. Irrigation is practised at Inkerman and in the Bundaberg area; cultivation is intensive and the produc-

tion per acre is high. The production of sugar per acre of cane grown has increased with greater efficiency. The high price of cotton during the Amer. civil war estab. cotton-growing in Q. in 1861-65, but after 1871 the industry rapidly declined and only revived in 1920-23. In 1944 only about 17,000 ac. were harvested for a production of 8,500,000 lb. of seed cotton. The present production of cotton comes from for the most part from the Rockhampton and Maryborough divs. Green sorghum, a summer-growing crop, has made rapid strides in Q. in recent years. The gross value of the leading crops for 1918 was sugar, £23,198,000; maize, £1,044,000; wheat, £5,300,000 (including bounty); green forage, £2,152,000; hay, £1,292,000; tomatoes, £618,000; pumpkins, £499,000; fruits, £2,612,000.

Of the total area of the state, 22,655,000 ac. have been alienated, whilst 5,118,000 are in process of alienation. Both unconditional and conditional selection of land is allowed, the latter being the more general. Some 429,120,000 ac. remain the property of the Crown. Land is made available for selection in (a) agric. selections, or perpetual lease; (b) grazing selections, or grazing homesteads and grazing farms; and (c) perpetual lease, prickly-pear selections. The largest area that may be acquired by any one person as a perpetual lease selection is 2560 ac. A number of pastoral properties are still held in large leases, areas of 500 sq. m. being not uncommon for sheep, and for cattle 1500 sq. m. or more, particularly where the country is far removed from the railway or is rough or dry country with a lower stock-carrying capacity. Grazing selections represent the closer settlement of the more accessible and better quality pastoral lands and are made available in areas of about 20,000 ac. for sheep and up to 60,000 ac. for cattle. Grazing homesteads and grazing farms have a term of lease up to twenty-eight years in seven-year periods. The area of prickly-pear selection may not exceed 2560 ac., and during the first period of the lease no rent is payable, but the prickly-pear must be eradicated and the land cleared. A large proportion of the area is leased in squatting runs for pastoral purposes, amounting to 243,174,000 ac. In 1947, besides 83,000,000 ac. in grazing selections. The average numbers of livestock in the five years 1940-45 (excluding 1942) were: cattle, 6,425,000; sheep, 23,865,000; horses, 407,000; and pigs, 117,000. The wool production, expressed as greasy was in 1939-40 195,770,000 lb., valued at £10,000,000; in 1944-45, 178,719,000, valued at £11,967,000; and in 1946-47 144,819,591, valued at £13,791,369.

The quantity of wood cut in the various saw-mills in 1946-47 was (in superficial feet) pine, 72,096,000; hardwood, 95,425,000; cabinet timber, 28,024,000; total value, £3,787,928. Some 87,180,000 sq. ft. of plywood were produced, valued at £1,000,358. There are some 24,000,000 ac. of commercial timberland in Q., of which 6½ million have been reserved for forestry purposes. A high proportion

of the secondary industries are works for processing primary products, among them being sugar mills, butter factories, saw-mills, and meat works. Other industries are railway workshops, and rubber mills. The value of production in 1946-47 was £34,238,000. The gross value of Q. primary production during the same years was over £73,000,000. Wool is easily the most valuable single item of the state's overseas exports, followed by sugar, meat, and butter. When sugar, meat, and butter are added to wool, the remaining items are normally of relatively little significance. Before the Second World War, in 1938-39, £21,148,625 (73·8 per cent) of Q.'s overseas exports of £28,651,842 went to the United Kingdom, which took £3,953,199, or 89 per cent of the meat, £3,380,596, or 39 per cent, of the wool, £7,343,482, or 97 per cent, of the butter, £3,685,747, or 88·7 per cent, of the raw sugar, and £1,524,219, or 75·6 per cent, of all minerals. Largest items amongst exports to foreign countries were wool, for which France and Belgium, with over £1,000,000 each, were the biggest customers, and copper concentrates, £398,990, all to the U.S.A. The total value of exports (£A) in 1946-47 was £13,195,353, as against £32,195,000 in 1939-40; exports in 1947-48 totalled £47,845,723.

In 1938-39, the last complete year before the Second World War, overseas imports were valued at £7,955,818 sterling, of which 42·7 per cent came from the United Kingdom, 15·5 per cent from other Brit. countries, and 41·8 per cent from foreign countries. Prin. imports from the United Kingdom were motor vehicles, machinery, hardware, drugs and chemicals, textiles and piece goods, paper and stationery, and various manufactured articles. The largest items from other Brit. countries were motor vehicles and paper; while petroleum, motor vehicles, and machinery and textiles were the main items from foreign countries. In 1946-47 overseas imports totalled £11,940,551 sterling. The United Kingdom supplied only £5,206,713 of this total, the chief item being textiles and piece goods, valued at £1,296,799. Foreign countries accounted for £1,185,123 of the total, the chief items being petroleum spirit, £1,214,919; lubricating mineral oil, £296,736; other oil, £276,859; motors, cycles, and parts, £337,923; hardware, etc., £248,422. Interstate exports in the year ended June 30, 1947, were £24,911,346 (including among the chief items various goods for trade use or for sale, largely raw sugar, gold, livestock and wool, groceries, builders' materials, machinery (excluding farming, meats and fish, fodders, etc.). Interstate imports were £10,862,963 (including goods for trade use or sale, groceries, clothing, haberdashery, boots and shoes, tobacco, cigarette, etc., builders' materials, etc.).

Education. Constitution, etc.—Education is free and compulsory and secular, the public expenditure in 1946-47 being £2,986,000. There are 1500 state primary schools, with an enrolment of 138,000;

19 state high schools and 17 high depts. attached to primary schools, with an enrolment of about 5380. There are also a number of private grammar schools, intermediate schools, rural schools, and correspondence schools. The state-aided univ. of Q., at Brisbane, was estab. by an Act of 1909 and opened March 14, 1911. There are now faculties of art, science, engineering, commerce, agriculture, law, dentistry, medicine, and veterinary science, with 3800 students. There are 12 technical schools with 12,300 students. Responsible government was conferred on Q. in 1859 when the state was separated from New S. Wales. Legislation and taxation are vested in a Parliament of one House, the Legislative Assembly, which comprises 75 members, returned for three years, and paid at the rate of £1000 per ann. There is a male and female adult franchise subject solely to twelve months' continuous residence in the state. Before 1922 there was also a legislative council, but this was abolished. There is a governor and Lieutenant-governor, with an executive council of ministers, each of the latter receiving a salary of £2250 a year. The net revenue of the state in 1948-49 was £31,457,235 and expenditure £31,442,430. There is no state church in Q., and the religious bodies, in their numerical order, are Church of England, Rom. Catholic, Presbyterian, Methodist, Lutheran, Baptist, and Jews. The prin. denominations retain free of charge the valuable lands granted to them before 1861. There are 6567 m. (1947) of gov. railway open in the state, with a gauge of 3 ft. 6 in. The cost of construction and equipment amounts to over £50,000,000.

The cap. is Brisbane, pop. 402,170, or some 36.3 per cent of Q.'s pop. Other towns with pop. at the end of 1944: Townsville, 34,200; Rockhampton, 35,000; Toowoomba, 33,300; Ipswich, 26,200; Cairns, 16,600; Bundaberg, 15,900; Maryborough, 14,400; Mackay, 13,500; Gympie, 8400; Charters Towers, 7600; Warwick, 7100; Southport, 8400; Gladstone, 5200; Ayr, 6000; Charleville, 3500; Dalby, 4000; Ingham, 3500; Innisfail 4000; Mt. Morgan, 3800; Mt. Isa, 3000; Redcliffe, 6800. There are many ports, but the contour of the coastline and the relative position of the inland dists. militates against any centralisation similar to that at Melbourne, Sydney, and Adelaide. Total pop. of Q., 1,091,200.

History.—Q. was visited by Capt. Cook in 1770, but little was known of the country until 1823, when Surveyor-General Oxley discovered the R. Brisbane. Cook landed at Round Hill Head, the S. point of Bustard Bay, and an obelisk with commemorative tablet has been erected on this spot. The Federal authorities have also placed a commemorative obelisk on Possession Is. in Endeavour Bay, where Cook formally took possession. The first settlement was at Moreton Bay in 1824, but in 1842 the penal settlement was finally broken up, and from that year free settlers were admitted to the country, since when progress has been remarkably

rapid, though checked during the depression of 1931. Pastoral occupation of the Darling Downs was commenced in 1840, and the Mary R. was occupied in 1843; but the aborigines murdered the shepherds, and so prevented permanent settlement for many years. A surveyor, J. C. Burnett, while seeking an overland route to the N. Australian settlement at Port Curtis, discovered the riv. which now bears his name, and, two years later, Wide Bay and Burnett dists. were settled. In the same period Warwick and Drayton on the Darling Downs were surveyed, and Maryborough on the Mary R. was settled in 1848. The first emigrant ship direct to Moreton Bay was the *Artemisia*, which arrived in 1848. A noted name in Q. exploration is that of Leichhardt, whose journey to Port Essington in 1844-1846 resulted in making known the existence of the Dawson, Comet, Mackenzie, and other rvs. Another notable explorer was Sir Thomas Mitchell, who visited the Maranoa and Warrego dists. in 1846-47. Ten years later squatters founded stations in the country around Rockhampton. There were many murders of squatters by the 'blackfellows,' but a force of black police, organised in 1848, afforded much protection. The progress made by settlers led to the separatist movement, and the N.E. part of the colony of New S. Wales (as it then was) was created a separate colony with the name of Q. by letters patent of June 8, 1859. The fatal journey of the celebrated Burke and Wills, and the relief expedition of John McKinlay, W. Howitt, and others opened up the W. dists. between the gulf of Carpentaria and the S. Australian border, and many pastoral settlements were made on the Warrego and Flinders Rs. Gold was discovered in 1868 at the head of the Mary R., where the Gympie field came into existence. Droughts have not seldom hampered the progress of Q., as in 1901. Political unrest ensued on this recurrence, and a Labour party made its appearance in the House. This party came into office in 1915, and among the changes it effected was the abolition of the Legislative Council in 1921.

See M. Flinders, *A Voyage to Terra Australis* (containing an account of his investigation of the Great Barrier Reef), 1814; Sir T. L. Mitchell, *Tropical Australia*, 1848; W. Coote, *History of Queensland, 1770-1881*, 1882; J. W. E. Roth, *Ethnological Studies among North-west Central Aborigines*, 1897; Palmer, *Early Days in North Queensland*, 1903; C. A. Bernays, *Queensland Politics during Sixty Years, 1919, and Our Seventh Political Decade*, 1932; R. I. Jack, *Northernmost Australia*, 1921; E. G. Brady, *The Land of the Sun*, 1924; F. Clune, *Free and Easy Land*, 1938; F. Ratcliffe, *Flying Fox and Shifting Sand*, 1938; G. H. Wilkins, *Undiscovered Australia*, 1938; and the *Queensland Year Book*.

Queen's Metal, alloy, of which the chief ingredient is tin. It is similar to Britannia metal, and answers the same purposes, being somewhat harder than pewter; the proportion of the ingredients varies.

Queen's Own Royal West Kent Regiment, see WEST KENT REGIMENT, QUEEN'S OWN ROYAL.

Queen's Remembrancer, see REMEMBRANCER.

Queen's Royal Regiment (West Surrey), see SURREY REGIMENT.

Queenstown: 1. Tn. of Cape Prov., S. Africa, on a 3500-ft. plateau near the Great Kei R., 132 m. by rail from East London. It is the centre of one of the richest wool-producing areas in S. Africa, and the social, educational, and commercial centre of Cape Eastern area. Q. was founded in 1853 as a link in the chain of border outposts, and the central feature is a hexagon originally intended as a rallying point in case of native disturbances, but now a garden. Pop., European, 8,100; non-European, 15,400. 2. Tn. of Tasmania, Australia, in Montague co., on the Queen R., 22½ m. by rail from Strahan, its port. The most important mining dist. of the state, the chief ores mined and commercially utilised are copper, silver, and gold; the ann. copper production is 15,000 tons. The Mt. Lyell Mining and Railway Company Ltd. is the pre-eminent enterprise. Pop. 4000. 3. Tn. of Elre, see 01111.

Queen's University, Belfast, was founded as a college of the Q. U. of Ireland and reconstituted a separate univ. in 1909. It has approximately 150 full-time profs and lecturers and nearly 3000 students. It has a new assembly hall, designed by J. MacGheagh, with Edward Maufe as consulting architect. The hall stands independently between the main building and the road. It is named after Sir Wm Whitla (d. 1930), a Belfast physician and for many years prof. of materia medica and therapeutics, whose bequests to the univ. have enabled the hall to be built.

'Queen, The,' ladies' magazine, estab. in 1861, the outstanding features of which are up-to-date coloured fashion-plates from Paris, enclosures of work-patterns of original design, and general export information on matters of dress. Originally a weekly, at 1s., it now appears fortnightly at 2s.

Queen Victoria (water-lily), see VICTORIA REGIA.

Queen Victoria School, Dunblane, Perthshire. Built as a memorial to Queen Victoria and opened in 1908. The school educates and maintains without charge the sons of Scottish soldiers, sailors, and airmen. Selection is made by his majesty's commissioners for the school: the age of entry is nine years. The school is under the direction of a commandant (a retired regular officer), assisted by a headmaster and administrative officer. The education is under the direction of the headmaster, an officer of the Royal Army Education Corps, assisted by R.A.E.C. officers and civilian teachers.

Queiroz, Jose Maria Eoa de (1843-1900), Portuguese author, b. at Villa do Conde. He attracted attention by his writings for the *Gazeta de Portugal*, but soon he left Lisbon for Evora, where he became editor of the *Distrito de Evora*. It was in this backward place that he learned the

manners, customs, and superstitions of a people quite different from those of the big cap. In 1875 his greatest book, *The Sin of Father Amaro*, appeared as a feuilleton in the *Revista Occidental*, and was pub. in book form in 1876. It is an attack on the manners and morals of the priests in a prov. tn., and was an immediate success. The Rom. Catholic Church put it on the Index. For many years his heirs did all they could to prevent the book being disseminated, but in 1930 a complete trans. into Ger. was pub. in Berlin. The rest of the writer's official life was spent in the consular service at Bristol, England, Havana, and Paris, in which latter city he died. He also wrote *Nephew Basilus*, a chronicle of Lisbon family life, pub. in 1878; the fantastic novel, *The Mandarin* (1879); *The Maias*, episodes from the romantic periods of Portuguese hist. (1880); and *The Celebrated House Ramires* (1900). *The Reliquie* was pub. in 1877 and also placed on the Index.

As a writer Q. started out as a romantic, specially fascinated by the irony of Heine and the flaming verses of Victor Hugo. Later his outlook was changed by his admiration of Flaubert.

Quelpart (Koran, Tsayetsyn), is. of volcanic origin, about 45 m. long and 21 m. broad, lying S.W. of Korea at the entrance to the Yellow Sea; discovered by the Dutch. Pop. 150,000.

Quenching, see under METALLURGY (METALLURGICAL HEAT TREATMENT).

Que Que, tn. of S. Rhodesia, 1515 m. by rail from Bulawayo, stands at an elevation of 3980 ft. It is a gold-mining centre and is also in a good farming and pastoral dist. High-grade iron ore and limestone occur in the dist. There are Anglican, Rom. Catholic, and Congregational churches, a public school, and mine hospital. White pop. 1100.

Quercia, Jacopo della, see DELLA QUERCIA.

Quercin, or Quercite, saccharine substance obtained from the liquid extracts of acorns.

Quercus, genus of deciduous and evergreen trees (see OAK).

Quevey, name of a dist. in S. France before the revolution, forming the present depts. of Tarn-et-Garonne and Lot. It was so called from the Cadurci, a Gallic tribe, and gave its name to cadurcum, a light linen.

Queretaro: 1. Central state of Mexico, enclosed by Mexico, Michoacan, Guanajuato, San Luis Potosi, and Hidalgo States, on a plateau between tribs. of the Lerma and the Toluca Panuco. It has silver, mercury, and copper mines. Cottons, grain, fruit, pottery, and iron wares are produced. Area 4432 sq. m. Pop. 244,700. 2. Cap. of the above state, 50 m. from Guanajuato and 150 m. N.W. of Mexic. city by the Central Mexican Railway. It is interesting historically, not only as the site of a pre-Aztec settlement but as the bp. of Mexican independence. It was captured by Sp. conquistadores in 1536 and made a city in 1655. In 1848 it was the venue of a

congress by which peace between Mexico and the U.S.A. was ratified. In 1867 the movement for Mexican independence was launched here, and it was here that the Emperor Maximilian, after his trial, was shot on the Cerro de las Campanas. Q. is a well-built tn. with a cathedral, fine churches, and convents, notably that of Santa Clara, a Franciscan monastery, hospitals, and old palaces. These latter include the federal palace and gov. palace, both built of basalt, and the municipal palace with romantic associations with the war of independence. Q. has a cotton mill which was estab. in 1840, an important opal mine, flour mills, and tanneries. Pop. 33,600.

Querfurt, tn. of Saxony-Anhalt, Germany, 20 m. W. of Merseburg on the R. Querne. Formerly the cap. of a small independent state, in 1635 it became a part of Saxony, and was transferred to Prussia in 1815. Cotton is manufactured and there are breweries and sugar refineries. Pop. 6500.

Querido, Israel (b. 1874), Dutch novelist and critic, b. in Amsterdam. He began his literary career principally in the field of criticism, where his judgments have been much esteemed in Holland. He has also achieved a popular reputation as a writer of fiction. Among his works are *Meditaties over Literatuur en Leven* (1898); *Menschenwee* (Toil of Men) (1903); *Literatuur en Kunst* (1906); *Kater Don Juan* (1930), etc.

Quern (O.E. *cweorn*), hand-mill, used before the invention of water- or wind-mills for grinding corn. A usual kind consisted of two circular stones, the upper being pierced by a hole in the centre and revolving on a wooden or metal pin inserted in the lower. The grain was dropped into the opening, and the upper stone revolved by a stick in a hole near the edge. Small ones are sometimes used for grinding pepper or mustard. The saddle-quern, a two-handed mill, allowing a backward and forward motion of the upper stone, is found in Neolithic cultures and frequently in the Late Bronze Age and Early Iron Age. Rotary Qs. were used in the Early Iron Age, and much developed by Rom. agriculturalists; in the latter period they were often made from lava derived from Andernach on the Rhine.

Quessada, com. and tn. of Jaén prov., Andalusia, Spain, on the Sierra de Cazorla, 40 m. from Jaén, with salt-mines near. Pop. about 10,000.

Quessal, or Long-tailed Trogon (*Pharomacrus mocinno*), large bird, native of Central Amer. forests, and of extraordinary beauty of plumage. The male has a tail about 3 ft. in length, the outer feathers of which are white with black bases, contrasting brilliantly with the rich metallic or golden-green of the head, back, and tail coverts; the breast is bright scarlet. The head bears a large rounded crest, and over the wings hang a number of fine drooping plumes. The female is much smaller, and lacks the long tail and decorative plumes. The diet is chiefly fruit.

Quesnay de Beaurepaire, Jules (1837-

1923), Fr. jurist and writer, early served as a soldier and a journalist. He was *avocat-général* at Paris (1883), and connected with most of the *causes célèbres* of the day, preparing the accusation against Gen. Boulanger before the high court (1889). *La Cocarde*, *L'Intransigeant*, and other attacks were written against him by the Boulangerist press. His work in connection with the Panama scandals was rewarded by his appointment as president of a section of the Cour de Cassation (1893-99). He resigned (1899) on account of disagreement with his colleagues during the reinvestigation of the Dreyfus case. Author of *Le Panama et la république* (1899); *Français et cosmopolites* (1901); *La Conspiration* (1907); and, under the pseudonyms of 'Jules de Glouvet' and 'Lucie Herpin', the novels: *Le Forestier* (1880); *Le Berger* (1881); *La Famille bourgeoise* (1883); *L'Idéal* (1884); *Le Père* (1886); and *Marie Fougère* (1889).

Quesnay, François (1694-1774), Fr. economist and physician, b. at Mérc, near Paris. He studied medicine and surgery in Paris, graduated M.D. in 1744, and was appointed physician to Louis XV. and to Madame Pompadour. He devoted himself to economic studies, and founded the sect of the 'Economistes', which included amongst its numbers Mirabeau, Baudeau, Lavièvre, etc. Q.'s theories are set forth in his articles on 'Fermiers' and 'Grains' in Diderot's *Encyclopédie*; and in the *Physiocratic* of Dupont de Nemours, a discourse on the law of nature. He wrote *Recherches sur l'évidence des vérités géométriques* (1773); and in the field of medicine his chief work was *Essai physique sur l'économie animale* (1736). His collected works, *Œuvres économiques et philosophiques*, with introduction by A. Oncken, were pub. in 1883.

Quesnel, Pasquier (1634-1719), Fr. Jansenist theologian, b. in Paris, joined the Fr. Oratory (1657). His ed. of the works of Leo the Great (1675) was condemned for Gallicanism, and accordingly placed on the Index (1676). Q. was banished from Paris for his Jansenist views (1681), and having refused to subscribe to a decree condemning Jansenism (1684), fled to Brussels, where Arnould (q.v.) befriended him. The Jesuits were always hostile, and had him imprisoned (1703), but he escaped to Amsterdam, founding there the still-existing Jansenist congregation. His *Nouveau Testament avec les réflexions morales* (1693-94) were condemned by the papal bull *Unigenitus* (1713). His *Lettres* were ed. by Le Courayer (1721-23). See L. Seebé, *Les Derniers Jansénistes*, 1891; Mme Albert le Roy, *Un Janséniste en exil*, 1900; A. Maillvault, *Répertoire de Port Royal*, 1902; and J. Pasquier, *Le Jansénisme d'après les sources*, 1909.

Quenoy-sur-Deûle, old fort. tn. of the dept. of Nord, France, 6 m. from Lille, on the Deûle. Pop. 3600.

Quételet, Lambert Adolphe Jacques (1796-1874), Belgian astronomer and meteorologist, b. at Ghent, became prof. of mathematics at Brussels Athenaeum (1819). He superintended the construction of the

Royal Observatory there (1826), becoming its director (1828). Q. held the chair of astronomy and geodesy at the Brussels Military School (1836), and was secretary of the academy from 1834. He is best known as a statistician. His works include *Sur l'homme et le développement de ses facultés* (1835, 1869); *Sur la théorie des probabilités* (1840) (see Herschel in *Edinburgh Review*); *Du système social et des lois qui le régissent* (1848); *L'Anthropométrie, ou mesure des différentes facultés de l'homme* (1871). See *Mémoires* and *Bulletins* of the Brussels Academy; E. Mailly, *Essai*, 1875; and M. Halbwachs, *La Théorie de l'homme moyen*, 1913.

Quetta, cap. of Baluchistan, Pakistan, lies at an elevation of over 5000 ft., 20 m. N.W. of the Bolan Pass. Regular troops of the Brit. Army in India were stationed at Q. before the Brit. evacuation of India in 1947. It is the headquarters of administration, and possesses an Indian staff college (opened 1907), a museum, a brewery, a gov. distillery, and flour mills. There are manufs. of felts, blankets, and rugs, and some coal is mined. The N.W. railway sends one branch from Q. to Chaman on the Afghan frontier and another from Sibi through Q. to the Persian frontier at Hoston. On May 31, 1935, some 20,000 people were buried in the ruins of their homes by an earthquake, and 10,000 others were killed by the havoc wrought by the earthquake in the surrounding dists. The city and the civil and railway areas were totally destroyed, while in the cantonment area the R.A.F. barracks collapsed and all remaining buildings were destroyed or rendered uninhabitable. The work of relief was accompanied by investigations of a reconstruction committee. The gov. accepted the recommendation to rebuild Q. on the old site as far as possible, the share of the cost from public funds to be £6,000,000. The probability was that the Pakistan Gov. would commandeer the college on terms to be agreed with the Brit. Gov. Pop. (1935) 49,000.

Quetta Bond, method in brickwork in which steel reinforcing bars are placed in cavities, filled with concrete, in the thickness of a wall.

Quetta-Pishin, dist. of Baluchistan, Pakistan, with chief tn. Quetta. Part of the soil is fertile, producing melons and other fruits, vegetables, and cereals. Area about 5310 sq. m. Pop. 156,000.

Quetzal, bird (*Pharomacrus mocinno*) of the Trogon family, of remarkably beautiful plumage, whose feathers were chosen for adornment of Guatemalan and Peruvian chiefs. The bird forms the badge of Guatemala.

Quetzalcoatl (from *quetzalli*, green feather, and *cohuatl*, snake), hero-god of the anc. Mexicans, especially worshipped at Cholula. He is sometimes represented as one of the four chief Mexican gods, controller of the air and winds, who assisted in the creation of man, or more frequently as a man with supernatural attributes who tried to abolish human sacrifices. According to a Toltec legend, Q. was a fair-skinned man who disappeared

across the sea, promising to return at a future date. Cortez made use of this legend. Jesuit authors embellished the myth, and sometimes identified Q. with St. Thomas. See W. H. Prescott, *The Conquest of Mexico*, 1878, and D. H. Lawrence, *The Plumed Serpent*, 1926.

Quetzaltenango, or **Quezaltenango**: 1. Dept. of S.W. Guatemala, Central America, bounded S. by the Pacific Ocean and Chorrera R., W. by Naranjo R. Of its volcanoes, Santa Maria (in eruption 1902-3) is the most noted. Coffee and sugar-cane plantations are in the S.E. Hides, rubber, maize, and wheat are also exported. Pop. about 211,500. 2. Cap. of above (founded as Xenahu or Xelahu), about 72 m. from Guatemala, at the foot of the Santa Maria volcano. An earthquake did much damage in 1902. Cottons, linens, and woollens are manufactured; coffee is the chief export. The sulphur baths of Almolonga are much visited. There is a radio station. Pop. 45,700.

Queuille, Henri (b. 1884), Fr. statesman, b. in Corrèze, where his father was mayor. He studied medicine, then took to local politics, became mayor himself, and gradually rose through the co. council to represent his neighbourhood in the chamber of deputies. From 1933 he was minister of agriculture in eight different govts., twice minister of public works, twice minister of health, once minister of posts and telegraphs, and finally minister of finance in 1940. His 'chief' was always Edouard Herriot and agriculture his forte. After the collapse of France in 1940 he crossed to England and took his place in Gen. de Gaulle's administration. Yet before he became Prime Minister in 1948 he was comparatively little known to the general public, in spite of having been a deputy for over thirty years and served in twenty-six govts. His opportunity came with the acute domestic crisis of mid 1948. With France more sharply divided than ever between Communists and non-Communists, the 'third force' evoked by the Socialists and the Popular Republicans ceased to count as a political factor. But the upward sweep of prices and rising inflation against a political background of Communist agitation and de Gaulle's intransigence was precisely the political situation which demanded a man of middle-class liberal outlook, free from extreme ideological bias, and of lifelong experience in public administration, and Q. exactly fulfilled these conditions, besides possessing an excellent working knowledge of the Fr. peasant and agriculture. His predecessors were Schuman (Popular Republican), André Marie (Socialist Radical), Paul Reynaud (g.r.), and Schuman for the second time, or four govts. within a few weeks. Q. succeeded Schuman as Premier on Sep. 12, 1948, and remained in office until 1. 1949 when he was succeeded by M. Bidault.

Queux, Sir, see KAY.

Quevedo y Villegas, Francisco Gómez de (1580-1645), Sp. satirist, poet, and dramatist, b. in Madrid, and brought up at court, his father being secretary and

his mother lady of the bedchamber to the queen. He was educated at the univ. of Alcalá. He was an accomplished swordsman, and in 1611 the fatal issue of a duel drove him out of Spain. He went to the court of the duke of Ossuna, viceroy of Sicily and later of Naples, who made him his minister of finance. At Ossuna's fall in 1619 Q. was imprisoned, but was released and allowed to go to the Sierra Morena. In 1623 he returned to Madrid and joined the court of Philip IV., where his political writings sev. times brought him into trouble, especially with Olivares, who had him imprisoned at Leon from 1639 to 1643. His work was varied and facile, but he wrote little of permanent value. His political works include *Política de Dios* (1626), an attack on the gov., and its apologue, *Hell Reformed* (1628). His best work is a brilliant picaresque novel, *Vida de Buscón Públes*, or *Gran Tacaño* (1626). It was trans. into Eng. by J. Davies (1657), by Capt. John Stevens (1697-1707), and by Watts as *Pablo de Segovia* in 1892. It is run close by his *Las Visiones* (1627), a vol. of fantastic philosophical essays, trans. into Eng. by Roger l'Estrange (1667, 1901). He also wrote sev. devotional prose works, sev. interludes and comedies, and occasional verse. The best collected eds. is in the *Biblioteca de Autores Españoles*. See lives and studies by J. Juderías, 1923, and L. Astrana Marín, 1925.

Quezon, Manuel Luis (1880-1941), first president of the Philippine Is., b. in humble circumstances in Luzon. He studied at the univ. of Santo Thomas but left to join the insurgents under Aguinaldo. Later he returned to the univ., was called to the Bar and became dist. attorney in Mindoro. A member of the first native Filipino Assembly, he began his long political association with Sergio Osmena, another young lawyer, whom Q. had appointed speaker in the assembly. Osmena estab. himself as the champion of the native movement for independence while Q. went to the U.S.A. as resident commissioner in Washington to plead for independence. Q. soon realised that the security of the Is. depended on strengthening their ties of friendship with the people of the U.S.A. His efforts resulted, in 1916, in the passing of the Jones Act, providing for a measure of autonomy and eventual independence. He then returned to Manila, becoming a senator there. But financial chaos now prevailed and the U.S. Gov. tightened their control over the Is. affairs with the result that Q. withdrew from politics until 1931. This time Osmena went to Washington to obtain terms for an agreement, but Q. regarded them as inadequate and, being successful at the polls, himself went to Washington once more and, with the Democrats in office, had no difficulty in procuring a treaty increasing Filipino powers of self-gov. with a promise of freedom after ten years. In 1935 he was elected the first president of the commonwealth of the Philippine Is. by an overwhelming vote. He then invited Gen. MacArthur to become his military adviser

and to organise the Philippine armed forces. His second term was inaugurated in an air-raided shelter in Dec. 1941, and it was not until a personal message from President Roosevelt reached him in 1942 that he left the Is. and, with his family and Cabinet members, joined MacArthur in Australia. A Bill was passed in Congress to enable him to retain the office of president until the Is. were cleared of the Jap., but he died from tuberculosis in New York in 1944. Q. lacked administrative experience but exercised his office with enthusiasm and dignity.

Quia Emptores (literally 'whereas purchasers,' from the opening words), statute passed in 1290 to stop the practice of subinfeudation. The Act directed that upon all sales of land the feeoffee (grantee) should hold the same, not of his immediate feoffor (grantor) but of the chief lord of the fee (or fief), of whom such feoffor himself held it. By granting out the whole or part of his estates to an under-tenant, any feudal tenant could, prior to 1290, escape his feudal obligations to his own overlord. The effect of the Act was to stereotype as from that date the number of fee simple (see ESTATE, FREE) estates or 'manors' in the country and to make freehold rent-service (see RENT) possible only as incidental to the reversion.

Quia Timet. A Q. T. action (lit. 'because he fears,' from the words in the form of the petition) in a court of equity (see EQUITY) has for its object the prevention of apprehended wrong. Instances of equitable remedies granted in such an action are the appointment of a receiver, the making an order to pay a particular fund into court, a garnishee order on money in a bank, an injunction (see INJUNCTION).

Quiberon, peninsula, fishing tn., and seaside resort of the dept. of Morbihan, Brittany, France, opposite Belle Ile. The peninsula (an Is. before the Middle Ages) is united to the mainland by an isthmus defended by Fort Ponthièvre. In the bay of Q., Hawke defeated the Fr. fleet under Confians (1789). In 1795 the Republicans under Hoche crushed the Royalist insurgents under D'Hervilly and Pélissier, supported by the Chouans and the Em. fleet, and suppressed their attempt to stir up La Vendée and Brittany against the Convention. There is a daily ferry to Le Palais (Belle Ile). Sardine fisheries are exploited. Pop. 3300.

Quiché, dept. of Guatemala, Central America. Its cap. of the same name (or Santa Cruz del Q.) is 90 m. W. of Guatemala city and stands 6500 ft. above sea level. The ruins of Utatán, the Indian city which the Spaniards destroyed, are near by. Pop. 18,000. Some 54 per cent of the pop. of Guatemala are pure Indians of twenty-one different groups descended from the Maya-Q. tribe.

Quichuas, or Quechuas, were an anct. Peruvian tribe whose original country was a dist. to the N. of the present dept. of Ayacucho. This tribe, under the Inca sovereigns during the thirteenth and fourteenth centuries, subjugated all the country from Ecuador to Bolivia and

Chili. They rose to a high state of civilisation, the gov. being a theocratic tyranny, the king aided by an hereditary aristocracy; but the rule of the dominant caste was enlightened. Floods were made, and the use of metals known, whilst in architecture they excelled. Their religion was a form of sun-worship. Writing was unknown, but hieroglyphics were used, and records, etc., kept by a system of knots in cords. At the fall of the Incas they submitted to the Spaniards, rebelling in 1780, but being suppressed. The Q. language is a rich agglutinative tongue. The people themselves, mostly engaged in agriculture, now number about 3,000,000, being of medium stature, olive in colour, with aquiline noses and straight black hair.

Quickens, or **Quick Grass**, see **COUCH GRASS**.

Quicklime, see **CALCIUM**.

Quicksand (*quick*, living, moving), bed of mass of loose, moving sand, saturated with water to such an extent that it readily yields to pressure and cannot support the weight of people or animals. It is usually very fine, mixed with clay or calcium carbonate. Sometimes fine mud with a thin layer of sand is called Q. Small tracts occur fairly frequently at riv. mouths (especially in the rivs of Iceland), or along the coast, differing little in appearance at a glance from the shore of which they form part. Old writers sometimes gave the name to the drifting sands (of a desert or the seashore) carried by the wind over the neighbouring cultivated land.

Quicksilver, see **MERCURY**.

Quickswood, Baron, see **CECIL, LORD HIGH RICHARD HILTHOTTE**.

Quidde, Ludwig (1858-1911), Ger. historian and pacifist, b. at Bremen, who, in 1892, led the Ger. peace movement, founding and editing the *Deutsche Zeitschrift für Geschichtswissenschaft* (1889-95). An outspoken democrat, he was imprisoned for a short term in 1894 for attacks on the militarism of imperial Germany in a book entitled *Caligula*. He became a member of the Republican Reichstag in 1912, was president of the Ger. Peace Society from 1914 to 1929 and of the Ger. Peace Cartel from 1920 to 1929, being the recipient (with Ferdinand Bausson) of the Nobel prize for peace in 1927. His publs. also include *Folkland und Demokratie* (1920) and *Die Schuldfrage* (1922).

Quid Pro Quo, in law, the giving of one thing of equal value for another; or the mutual consideration and performance of both parties to a contract. See **CONSIDERATION**; **CONTRACTS**.

Quietism, name given to a form of mysticism which has shown itself at different times in the Christian Church. The fundamental tenet of Q. is that the final state of union with God is reached when the soul is in a state of perfect inaction, and that in this union the soul is purely passive under the action of the Divine Light. The belief was held by many heretical sects of the early Church in both E. and W., and its affinity with

the Neoplatonic doctrine will at once be seen. The name, however, was first used in connection with the adherents of the Sp. priest Molinos, whose book, *The Spiritual Guide*, was condemned in 1687. Mme Guyon is one of the best known of the Quietists, and through her similar views were accepted by Fénelon till they were condemned by Innocent XII. in 1696, when he repudiated them. The Quakers' doctrine of the inward light is very similar to that held by the Quietists. See J. Denis, 'Quietisme,' in *Mémoires de l'Académie de l'En*, 1891; II. Hippo, *Geschichte der Quietistischen Mystik in der Kathol. Kirche*, 1875; and A. Farges, *Mystical Phenomena*, 1926.

Quilesa, tn. and port of Peru, 30 m. by sea N. of Mollendo, is a deep and safe port, but suitable only for small craft. A road through Camana links it with the Pan-Am. Highway. The port serves the Camana valley, a cotton-growing centre, and other products include cattle and wine. The pop. of the valley, 20 m. distant over the coast road, is 9000.

Quilimane, or **Kilimane**, port of Portuguese E. Africa, on the Quilimane R. (Kwa-Kwa, N. branch of the Zambezi), about 8 m. from the sea; unhealthy owing to the surrounding mangrove swamps and rice-ground. Above Q. the riv. is navigable by canoes to Mopeia. Exports include ivory, copra, rubber, wax, coffee, oil-seeds, skins, and ground nuts. Pop.: tn. about 7000; dist., with Chinde about 530,000.

Quiller-Couch, Sir Arthur Thomas (1863-1944), Eng. author and prof. of Eng. literature, b. at Bodmin, Cornwall, eldest son of Thomas Q.-C.; and grandson of Jonathan Couch, of Polperro, tithingologist. Educated at Newton Abbot College, Clifton College, and Trinity College Oxford, and while at the univ. he pub. in 1887, *Dead Man's Rock*, which met with considerable success, and enabled him to enter upon a literary career. This 'thriller' undoubtedly owed much to the influence of R. L. Stevenson, whose unfinished *St. Ives* he completed about this time. He went down from Oxford in 1887, after having been a lecturer in classics at Trinity for a year. After four years in London in literary adventures he returned to the W. country. In 1889 he married a daughter of John Hicks, of Fowey, and Cornwall was his home for the rest of his life. *The Astonishing History of Troy Town* (1888) introduced his favourite tn. Fowey under the name of Troy. In London in 1889 he joined the staff of the *Liberal* weekly, the *Speaker*, thus gaining some journalistic experience. In the *Speculator* he wrote weekly about current literature, his articles being collected in a vol. entitled *Adventures in Criticism*. Like Dr. Johnson Q.-C. made no fundamental distinction between good literature and good journalism. However trivial the subject, he always wrote with style. It is nevertheless true that his prominence as a critic dates from the pub. of his *Oxford Book of English Verse* (1900), which was on all hands recognised as the true

successor of Palgrave's *Golden Treasury*. In his early days he wrote under the pseudonym of 'Q.'. He was knighted in 1910, and in 1912 he was appointed King Edward VII. prof. of Eng. literature at the univ. of Cambridge, being elected a fellow of Jesus College. His inaugural address as prof. was delivered in Jan. 1913, and was followed by a series of lectures which now for many years have been well known and admired as books entitled *On the Art of Writing* (1916) and *On the Art of Reading* (1920). Amongst his books are *The Ship of Stars* (1899); *The Adventures of Harry Revel* (1903); *Hetty Wesley* (1903); *Sir John Constantine* (1906). He ed. *The Golden Pome*



SIR ARTHUR QUILLER-COUCH

Eng. lyrics, 1895); *The Oxford Book of English Verse* (1900); *The Oxford Book of Ballads* (1910); *The Oxford Book of Victorian Verse* (1912); *The Oxford Book of Prose* (1925); *The Poet as Citizen* (1934); and *Q's Mystery Stories* (1937). He was also general editor of the *Kings Treasures of Literature* (258 vols.), begun in 1920, and ed. with J. D. Wilson the comedies in the New Cambridge ed. of Shakespeare. His professorial lectures have been printed under the following titles: *Studies in Literature* (3 series, 1918), etc.; *Shakespeare's Workmanship* (his greatest work of criticism, 1920); and *Charles Dickens* (1925). There is a cheap collected ed. of his tales and romances, and a '*Q. Anthology*, ed. by F. Brittain (1948). His poems were collected in 1929. His unfinished autobiographical *Memoirs and Opinions* was pub. in 1944. See life by F. Brittain, 1917.

Quillota, tn. in the prov. of Valparaíso, Chili, about 26 m. N.E. of the tn. of Valparaíso. Its chief products are wine and copper. Pop. about 15,000.

Quilmes, industrial tn. of Argentina, on the Roca railway. Noted for its large brewery, its other products include textiles, rayon, and glass. It has an Eng. college and a high school for girls. It is also a favourite summer resort. It has many Brit. residents. Pop. 100,000.

Quiloo, see KILWA KISIWANI.

Quilon, seaport tn. of Travancore, India, situated about 37 m. W.N.W. of Trivandrum. It is an old tn., and originally held a position of some importance. Pop. about 25,000.

Quilter, Roger (b. 1877), Eng. composer, b. at Brighton and educated at Eton. He studied music with Knorr at Frankfurt. He has never held any official musical posts. His works include opera *Julia*; radio opera *The Blue Boar*; incidental music for Shakespeare's *As You Like It* and the children's fairy-play *Where the Rainbow ends*; *Children's Overture* on nursery tunes; serenade, *Three English Dances*, etc., for orchestra; song-cycle *To Julia* (Herrick), songs to words by Shakespeare, Tennyson, and others, etc. Q.'s songs are especially and deservedly well known. His artless melodic invention has a refined and distinctive harmonic spirit which outweighs distinct limitations of manner.

Quilting, see under EMBROIDERY.

Quimper, or Quimper-Corentin, cap. of the dept. of Finistère, France, situated about 36 m. S.E. of Brest on the R. Odet. Its cathedral, dating from the thirteenth century, is a beautiful example of Gothic architecture. It is a fishing tn., and manufactures pottery and paper. Pop. 20,100.

Quimperle, tn. in the arron. of Quimper, Finistère, France, situated about 27 m. S.E. of the tn. of Quimper. Pop. 10,700.

Quin, James (1693-1766), Eng. actor, son of an Irish barrister, b. in London, and educated at Dublin. He made his first appearance on the stage in 1710 at Dublin, and in 1714 was seen at Drury Lane Theatre, London, in small parts, making his mark in Nicholas Rowe's *Tamerlane* the following year. In 1716 he went to the theatre in Lincoln's Inn Fields, where he remained for fourteen years. The rest of his career was divided between Covent Garden and Drury Lane. He was acknowledged to be the finest actor in England till the appearance of Garrick in 1741. Falstaff in *King Henry IV.* was the character in which he excelled. See anonymous life, 1887.

Quin, Windham Thomas Wyndham-, see DUNRAVEN AND MOUNT EARL, EARL OF.

Quince (*Cydonia vulgaris*), low spreading tree (family Rosaceae) with white or pink flowers, followed by fragrant but bitter yellow fruit, which when mixed with apples makes an excellently flavoured preserve, and is often used in pies and tarts. The tree is surface-rooting, making a large number of fibrous roots, and is therefore an excellent stock on which to graft pears. The Jap. Q. (*C. Japonica*) is a small tree, bearing oval leaves and fine red flowers, for which it is frequently grown in gardens. It is probably a native

of Persia, and has been cultivated from a remote period.

Quincey, Thomas de, *see* DE QUINCEY.

Quineux, arrangement of five objects set so that four are at the corners of a square or rectangle and the other at the centre (e.g. the five on dice or cards); it is frequently adopted in plantations. In medieval astrology the word was used to describe an arrangement of planets when at a distance from each other of five signs, or 150°.

In botany *Q.* denotes a particular arrangement of the leaves which is found in certain trees such as the apple, pear, and cherry. The sixth leaf on a stem is vertically above the first, after two turns of the spiral. *See also* under ROMAN ARMY.

Quincy, Josiah (1772-1864), Amer. statesman and patriot, b. at Boston, graduated at Harvard, and called to the Bar in 1793. He became a leader of the Federalist party in Massachusetts in 1800, and remained in Congress till 1812. He possessed fine oratorical powers, and a statesmanlike grasp of affairs. In 1822 he was appointed judge of the municipal court of Boston, and in 1829 president of Harvard Univ., a position he retained till 1845. His last years were spent in retirement, chiefly on his farm in Quincy. Amongst his pubs. are *History of Harvard University* (2 vols.) (1840); *The Municipal History of Boston* (1852); and *Memoir of John Quincy Adams* (1858). *See* *also* by E. Quincy, 1867.

Quincy: 1. Co. seat of Adams co., Illinois, U.S.A., on the Mississippi, 95 m. from Springfield. It has fine public buildings and parks. Manufs. include stoves, vehicles, agric. implements, incubators, and tobacco, and there is trade in grain. Pop. 40,000. 2. City of Norfolk co., Massachusetts, U.S.A., on Q. Bay, 8 m. from Boston, noted for fine granite quarries. There are shipbuilding yards and foundries, and manufs. of oils, chemicals, boots and shoes, ironware, etc. It has historical interest and was the bp. of John Hancock, John Adams, and John Quincy Adams. Pop. 72,000.

Quinine, alkaloid found in the bark of various species of cinchona, from which it is obtained by mixing the bark with milk of lime, treating with boiling alcohol, and extracting the alkaloid in the form of the sulphate by adding dilute sulphuric acid. The sulphate, which is the form most generally met with, is soluble in 780 parts of cold water, but is more readily soluble in hot water and in alcohol. It is used in medicine as a tonic, an antipyretic, and a specific in malaria, in which disease its value is most pronounced. It acts as a stimulant to the nervous system, lessens the anæmoid movement of the white corpuscles, and lowers the temp. If it is higher than normal. Taken in excess, it produces ringing in the ears, disturbance of the vision, headache, and irritation of the digestive tract. Its chemical formula is $C_{20}H_{24}O_2N_2 \cdot 3H_2O$, and its molecular structure has been elucidated by Koenigs and other chemists. It has recently been synthesised by Woodward and Döring

from hydroxyisoquinoline. *See also* CINCHONA BARK ALKALOIDS.

Quinoa (*Chenopodium quinoa*), herb, allied to the common Brit. goosefoot, cultivated in Chili and Peru for its seeds, which are boiled like rice for eating, or are roasted to produce a coffee-like decoction known as carapulcra.

Quinol, or **Hydroquinone**, colourless crystalline solid (m.p. 169° C.), known in chem. as para-dihydroxybenzene. It is prepared by reducing quinone (q.v.) with sulphurous acid (q.v.), and owing to its strong reducing powers it is used as a photographic developer.

Quinoline (C_8H_7N), aromatic base occurring with its isomer, *isoquinoline*, in the fraction of coal-tar collected between 236 and 243° C.; it is usually prepared by the 'Skraup' reaction, viz. heating a mixture of aniline and glycerol with concentrated sulphuric acid and nitrobenzene. *Q.* is a colourless liquid, boiling at 239° C. It has a pleasant smell, is sparingly soluble in water, but dissolves readily in alcohol, ether, and chloroform. *Q.* itself is used as an insecticide, and certain of its derivatives are valuable medicinally. *See also* LERCOL.

Quinones, class of organic compounds known as the *Qs*. The simplest member of this class, benzoquinone ($C_6H_4O_2$), is obtained by oxidising aniline with potassium dichromate and sulphuric acid. It is a yellow crystalline solid, melting at 116°, has an irritating smell, is volatile in steam, dissolves sparingly in water but readily in alcohol and ether. Many other *Qs* can be obtained by the oxidation of certain hydroxy- and amino-compounds with chromic acid. They possess the same general physical properties. Anthraquinone, $C_{14}H_8O_2$, is important as the source of many valuable dyestuffs, while benzoquinone (often known simply as '*Q.*') yields the photographic developer quinol (q.v.), when reduced with sulphurous acid.

Quinquagesima (Lat. fiftieth), Lat. name for the Sunday before Ash Wednesday. Counting roughly, this Sunday is fifty days before Easter, and on this account receives its name. It is rather difficult, however, to explain satisfactorily the names of this and the two preceding Sundays, as the time of beginning Lent varied very considerably in the early church.

Quinquereme, anct. type of warship propelled by five banks of oars on either side. It is said to have been introduced by Dionysius of Syracuse about 400 B.C.

Quinsy, *see* under TONSILS.

Quintain (from Lat. *via quintana*, the place for exercise in a Rom. camp), name given to an object, mounted on a support, to be tilted at, a pastime in vogue in the Middle Ages. It was generally a swinging bag, although the post itself had sometimes to be struck so as to smash the lance.

Quintal (connected with Lat. *centum*, 100), weight used in Spain, Italy, Portugal, and Argentina. It equals 100 libras, but as these vary somewhat it is equivalent in Spain and Portugal to 101·4 lb.

and in the Argentina to 101.27 lb. The old Fr. Q. was equal to 100 livres (108 lb.) and the metrical Q. is 100 kilograms (220.49 lb.).

Quintana de la Serana, tn. in the prov. of Badajoz, Spain, about 66 m. E.S.E. of the tn. of Badajoz. Pop. 2000.

Quintanar de la Orden, tn. in the prov. of Toledo, Spain, about 57 m. S.E. of the tn. of Toledo. Pop. 9000.

Quintana Roo, federal ter. of Mexico, in the Yucatan peninsula, with the Caribbean Sea to the E. Constituted in 1902, it has an area of 19,438 sq. m. Cap. Chetumal. Pop. 18,800.

Quintero, Serafin Alvarez (1871-1938), and Joaquin Alvarez (1873-1944), Sp. dramatists, brothers, b. at Ultrera, Seville. In their graceful plays they revived the traditional humour of Rueda's *pasos*. Most of their pieces have a background of Andalusian life. Some are *Los Galeotes* (1900); *Las Flores* (1901); *Malvaloca* (1912); and *La Calumniada* (1919). They are not remarkable for deep moral or social purpose, nor indeed for characterisation, but the dialogue is always irresistible. See Helen and Granville-Barker, *Four Plays by Joaquin and Serafin Quintero*, 1923.

Quintet, musical composition, written for five parts, vocal or instrumental, in which each part is essential to the rendering of the whole work, more particularly a chamber work in sonata form for five instruments, usually pianoforte and string quartet (pianoforte Q.) or five stringed instruments (string Q.). Of vocal Qs., the most famous is that which occurs in Wagner's *Meistersinger*. Qs. for stringed instruments have been composed by Mendelssohn, Schubert, Beethoven, and others, while Qs. for other instruments have been written by Mozart, Raff, Brahms, Schumann, and Schubert.

Quintilian (Marcus Fabius Quintilianus) (c. 40-c. 100). Rom. critic and rhetorician. Probably b. at Calagurris, N. Spain, and educated at Rome. In 68 he returned to Rome in the train of Galba, and obtained a high reputation as a plender and teacher of oratory. His great work is *De Institutione Oratoria*, a treatise in twelve books on the education of a rhetorician. It is written in a clear though ornate style, exhibiting excellent judgment, taste, and learning. The best eds. are by G. L. Spalding, C. T. Zumptius, and E. Bonnell (1798-1834). C. Halm (1868-69), F. Meister (1887), and A. Radermacher (1917-35), and there are Eng. trans. by Guthrie (1756), J. Patsall (1774), J. S. Watson (1855-56); and F. H. Colson (1924). See J. Cousin, *Etudes, sur Quintilien*, 1936.

Quintinus, or Quentin, St. (d. 287), traditionally supposed to have been a Romy. by birth. A missionary to Gaul, he converted the inhab. of the Amiens dist., being martyred at the tn. now called St. Quentin.

Quintuple Treaty (1839). Celebrated 'scrap of paper,' the breach of which was the immediate cause of the entry of Great Britain into the First World War. It was by this treaty that the neutrality of

Belgium was guaranteed by the great powers after Belgium had revolted from the union with the Netherlands in 1830. The Q. T. imposed a moral obligation on each signatory to respect its provisions irrespective of whether these were violated by any other signatory. Strictly there were two treaties: the first, wherein the king of the Netherlands agreed with the five powers (Austria, France, Great Britain, Prussia, and Russia) to recognise the existence of Belgium as 'an independent and perpetually neutral state, bound to observe neutrality toward all other states'; the second (not signed by the Netherlands), whereby the five powers guaranteed the provisions of the first treaty. An important feature of this treaty is that it omitted provisions in previous agreements (which were of a temporary nature) for the occupation of Belgian fortresses by Great Britain and Prussia. Thus no signatory contemplating a breach could start with this definitive advantage over the other signatories. In 1866-67 a draft second treaty was concluded between France and Prussia by which Napoleon III. proposed that he should annex Belgium in consideration of facilitating the union of Germany with and under Prussia in the 'North Ger. Confederation.' Bismarck betrayed this conspiracy and gained his object without paying the price. When the Franco-Prussian war of 1870 broke out the Brit. Gov. asked the belligerents to state their intentions with regard to Belgium. Neither wished to invite Great Britain's intervention and hence each disavowed any intention of crossing the Belgian frontier, and duplicate treaties were signed to that effect, the Brit. Gov. undertaking at once to declare war on the party infringing this proviso. These treaties were to be operative during the war and twelve months after, the independence and neutrality of Belgium depending on the expiration of that period, as heretofore on the treaty of 1839. To whatever degree this treaty was made in the interests of the guarantors it was clearly as much to Belgium's advantage. Its violation by Germany was not seriously defended by the Ger. Gov. See BELGIUM; NEUTRALITY.

Quintus Calaber (Calabar or Smyrnaeus), Grk. poet of the fourth or fifth century A.D., so called because his epic, *Paralipomena Homeri* or *Posthomerica* (continuing the Trojan war from Hector's death to the return of the Grks.), was discovered at Otravul in Calabria in the fifteenth century. His materials were mainly derived from the cyclic poets, especially Lesches and Arctinus. The first ed. of Q. was printed with Tyrphodorus and Coluthus (probably his contemporaries) by Aldus (c. 1505). See eds. of T. C. Tychsen (1783, 1807) and H. A. T. Koehly (1853); and A. Dyce, *Select Translations*, 1821. See G. W. Paschal, *A Study of Quintus of Smyrna*, 1904.

Quintus Curtius Rufus, see CURTIUS. **Quintus of Smyrna**, see QUINTUS CALABER.

Quipu (Peruvian *quipu* knot), also

quippu, *quipo*, *quipos*, *quipus*, or *kipus*, was a knot device of communication employed in anct. Peru. It generally consisted of a number of threads or cords of different length, thickness, and colour, mainly of twisted wool, hanging from a top-hand or crossbar. It was used as a method of recording historical events and edicts, reckoning accounts, and sending messages. The number, size, position, distance apart, and colour of the knots all had particular meanings. Some other anct. peoples (in China and Tibet) and some primitive tribes of the present day have also employed similar mnemonic devices of communication.

Quirinal, one of the seven hills on which Rome was built, N. of the Palatine, and one of the oldest quarters of the city. On it stands the Rom. palace of the kings of Italy, known by the same name.

Quirinus, see ROMULUS; MARS.

Quirites, name which the citizens of Rome assumed in their civic capacity. It is connected with Quirinus, an anct. Rom. deity possibly associated with Mars.

Quisling, **Lauritz Vidkun Abraham** (1887-1945), Norwegian politician, b. at Eysedal, graduated in 1911 from the Norwegian royal military academy. From 1921 to 1926 he worked for Nansen and for the League of Nations, residing mainly in Moscow. He entered politics on his return to Norway in 1929, proving a rabid anti-Communist, though few Norwegians ever regarded him seriously. He became defence minister in 1931, later founding a Fascist party, the Nasjonal Samling; but his activities as a minister were criticised continuously and his motives were suspected. His actions during the Second World War gave a new name to the old crime of treason. In April 1940 Dr. Brauer, Ger. minister in Oslo, insisted, after the Norwegians had repulsed the Ger. motorised force sent against Oslo, that Q. must lead any administration the Gers. were willing to accept. But although Koht, the Norwegian foreign minister, appeared ready to consider a change of gov. which would make possible collaboration with Germany, this subversion to a discredited puppet was too much to ask and the king refused Brauer's demand. After the betrayal by Q. public opinion was so strong against him that even the Gers. could not ignore it. Hence Q. was shelved and did not reappear until Sept. 1910, when the Gers. made their capital blunder of restoring Q. to power at the same time as they disposed of all the political parties except Q.'s party, Nasjonal Samling. Having shelved Q. for the first time the Gers. tried to win the Norwegians over by assuming the role of friendly 'protector.' This was Norway's most dangerous hour, but the people were intransigent and the opposition stiffened. By the end of Sept. 1940 Terboven, the Ger. governor, threw off the mask, and, in a series of so-called decrees, 'deposed' King Haakon, dissolved the gov., abolished all political parties except Q.'s own, and set up a puppet gov. entirely composed of quis-

lings. After the surrender of Germany the Q. or traitor 'gov.' fled the country (though Q. stayed), and the Norwegian Gov. returned to Oslo from its temporary refuge in London. Q. was eventually tried for treason and executed. See **NORWAY, History**.

Quisqualis, genus of climbing shrubs (family Combrataceae), with terminal clusters of white or orange-red flowers, natives of India and the Malay Archipelago. *Q. indica* is grown in stovehouses.

Qui Tam, in law the name given to a penal action (see **PENAL STATUTES**) in which part of the penalty is given to the Crown and the other part to the common informer. So called because the writ describes the plaintiff as one '*qui tam pro domino rege quam pro se ipso sequitur*' ('who sues as well for himself as for the king').

Quito, city in the prov. of Pichincha, and the cap. of Ecuador, situated about 160 m. N.N.E. of Guayaquil. Nearly 10,000 ft. above sea level, it enjoys a temperate climate, though close to the equator. Although, indeed, Q. is almost on the equator, the air is always chilly owing to the altitude; the average monthly temp. is 51° F., with a range of less than one degree. Q. is well arranged, and has sev. large squares among them the Plaza Mayor. The centre of the tn. is the Plaza Independencia, a plaza of gardens, fountains, and tropical trees. The city is old and was originally the cap. of the Incas, estab. on the site of an old Indian vil. on the slopes of the volcano Pichincha. The volcano is no longer active, and on its lower, gentler slopes are small farms devoted chiefly to grains and potatoes. Q. has a univ. and a fine cathedral, the see of an archbishop. The chief manufactures are shoes, woollen and cotton materials, saddles, blankets, and carpets. The railroad to Q. has its terminal on the E. bank of the Guayas R. There is an air service between Q. and Guayaquil. During the colonial period Q. was administered first from Lima and later from Bogotá. When the wars of independence freed the colonies from Spain, Q. was included with Colombia and Venezuela in a 'Greater Colombia,' which Bolívar in vain attempted to form and administer from Bogotá. Pop. 142,100.

Quit Rents, one of the peculiar remaining incidents of copyhold tenure. The name is also given to freehold or 'chief-rent' (see **QUIT EMPLOYERS**). By the Conveyancing Act, 1881 Q. R. may be redeemed by paying to the person absolutely entitled the price certified by the Ministry of Agriculture.

Quixote, **Don**, see under **CERVANTES**.

Quixote, **Don**, see **Quixote**.

Quixote, **Don**, see **Quixote**.

Quoins, blocks at the corners of buildings, which together make up the external angles. When projecting a little, they are termed *rustic* Qs. (see **MASONRY**). Also short blunt wedges used by compositors to secure the type in the chase. Mechanical Qs. worked by a central screw operating an expanding device are sometimes used. The term is applied in many

trades, etc., to pieces of wood, stone, etc., used for wedging.

Quoits, game having some resemblance to the anct. practice of discus-throwing, though it is more skilful and does not require so much strength. The game is played as follows: two iron or steel pins or 'hobs' are placed in the ground at a distance of 18 yds. apart, and round each of them a circle of 3 ft. diameter is drawn. Play may be from either end, as in bowls. The object of the game, which may be played by any number of players divided into sides, is to throw the Q. as near the pins as possible. A ringer (or quoit surrounding the pin) counts two points, and the quoit nearest to the hob one point. The curling and bowling principles of driving away opponents' balls are followed. The quoit is, as a rule, about 7-9 lb. in weight, not more than 8½ in. in diameter, and with a hole of about 2½ in. diameter for the thumb or forefinger. Q. dates from the fifteenth century, and is played now in Britain, principally in Scotland, Lancashire, and the Midlands. It is also played in America.

Quorn, one of the most famous hunts and hunting packs in England, named from Quorndon (q.v.), though its actual centre is at Melton Mowbray.

Quorndon, par. and tn. of Leicester-shire, England, 2 m. from Loughborough, 1 m. from Barrow station. Pop. about 3100.

Quorra, *see* NIGER.

Quorum. In law a justice of the peace is said to be of the Q. when the commission appointing him expresses that he is one of those whose presence is necessary to constitute a bench, as at quarter sessions. The term Q. in this context is derived from the words in the Lat. form of the commission: 'Quorum unum A. B. esse volumus' ('Of whom we will that A. B. be one'). Hence by analogy, in any assembly, committee, etc., when it is necessary that a certain number of officers or members should be present to give validity to its acts, that number is said to constitute a Q.

Quota, commercial term in international trade. In treaties negotiated after the First World War it signified the quantities of essential commodities for which export and import licences were issued respectively by the countries concerned. Also, after the First World War, immigration Qs. based on preferences for certain races—such as the Nordic in America—as immigrants were estab. in the U.S.A. and in other countries (*see* IMMIGRATION). The Brit. Colonial Office in 1934 introduced a Q. scheme for imports of secondary goods into the Crown colonies in order to restrict the excessive importation of 'sweated' goods from Japan (the introduction of higher tariffs was out of the question as being incompatible with the Congo Basin treaties governing preferential tariffs in the import trade of African dependencies and providing, *inter alia*, for completely free trade within the area to which the treaties applied). Great Britain also has a film Q. establishing

the proportion of Brit. films which must be shown. The Brit. Gov. also applied the Q. system to the importation of wheat and other foodstuffs after the First World War. In Great Britain the term also refers to the proportion of home-grown wheat to be used by millers under the provisions of the Wheat Act in making flour. *See further under* AGRICULTURE, A. during and since the First World War.

Quotidian Fever, *see* MALARIA.

Quo Vadis?, *see* SIENKIEWICZ, HENRYK. **Quo Warranto**, old writ formerly issuing from the king's bench div. against any one who claimed or usurped any office, franchise (q.v.), or liberty, to inquire by what authority he supported his claim, in order to determine the right. It lay also in case of non-user or long neglect of a franchise, or abuse of it, and commanded the defendant to show by what warrant he exercised such franchise, having never had any grant of it or having forfeited it by neglect or abuse. The judgment on a writ of Q. W. was final and conclusive, even as against the Crown. It has long ago fallen into disuse, having been superseded by an *information* (a mode of criminal prosecution) filed by the attorney-general. The term is especially applied to a unit of inquiry set up in 1278 by Edward I., who desired to examine the warrants by which barons and corporations owned land and exercised jurisdiction, in an attempt to prevent encroachments on the privileges of the Crown.

Qurna, El, or Kurna, tn. of Iraq, 45 m. N.W. of Basra, on the Tigris. The reputed site of the Garden of Eden is in the dist. The tn. has strategic importance, and stands on an anct. site.

Qutb-ud-din Aibak (d. 1210), founder of Muslim dominion in India. He fl. in the late twelfth and early thirteenth centuries, during Mohammad Ghori's invasion of India. Q., in his youth, had been brought as a slave from Turkestan, but after being sold to the local governor of Nishapur, passed into the hands of Mohammad. He was a fine rider and a good archer, was well enough educated, and rose to the highest rank in the service of Mohammad, who appointed him viceroy of his N. conquests. After the death of Mohammad Ghori Q. became independent and ruled N. India until his death in 1210 from an accident at polo. The royal line he estab. on an insecure throne is known in Indian hist. as that of the 'slave kings' from the origin of Q. His death was followed by revolt among both the Muslims and Hindus and, in 1211, the Muslim nobles offered the throne to Shams-ud-din Iltutmish, son-in-law of Q. and a member of a prominent Turkman family. Q. and Iltutmish between them erected on an enclosed space at Delhi the magnificent buildings known as the Jamī mosque (Jamī Masjid), the first to be built in India, and the Kutb-ud-din or Quwwat-ul-Islam mosque. *See* Sir H. Sharp, *Delhi: its Story and Buildings*, 1926; J. A. Page, *A Guide to the Qutb* (Delhi), 1938; and Sir G. Dumbor, *A History of India* (new ed.), 1943.

R

R, the eighteenth letter of the Eng. alphabet, was the nineteenth in the numerical, seventeenth in the ordinary, (Gk. alphabet, seventeenth in the Rom., and twentieth in the Phœnician. The earliest form of *r* was the Phœnician 𐤓; in Gk. the symbol became *ρ*, a short tail being at one time added, from which the Lat. and Eng. *R* is derived. Other forms of *R* were introduced at different times. The Semitic name of the letter is *rēsh*, meaning 'head' (*rōsh*), but it is doubtful whether this letter ever had the form of a head. The value of the character is always the same, a continuous sonant utterance made between the tip of the tongue and the roof of the mouth at a point more or less removed from the upper front teeth. The sound of *r*, however, varies more than that of any other consonant, accordg. to language or dialect. A syllabic *r* is found in many languages, and was probably present in the Indo-European mother-tongue. The Semitic *r* was probably trilled, whilst the *r* of modern India is a cacuminal *r*. In Chinese the sound *r* does not appear. In Great Britain Scotsmen and Welshmen trill their *r*'s more than Englishmen; Ger. and Fr. *r*'s are on the whole uvular. In chem. *R* is often used as a symbol for an alkyl group, $C_{12}H_{25}$, while *Ra*, *Rb*, *Rc*, *Rh*, *Rn* and *Ru* are the symbols for one atom of radium, rubidium, rhodium, radon, and ruthenium respectively.

R101, see under AIRSHIP.

Ra, see EGYPT (HISTORY).

Raab, see GYON.

Raabe, Wilhelm (1831-1910), Ger. novelist, *b.* at Eschershausen, Brunswick. He was a student at Berlin Univ., where he took up philosophy, and while there pub. his first work, entitled *Die Chronik der Sperlingsgasse* (1857), which was well received. At Stuttgart he wrote *Der Hungerpastor* (1863); *Abu Talfan* (1868); and *Der Schudderdump* (1870). His later works, among which were humorous novels and historical tales, written at Brunswick, include *Horracker* (1875), considered by most people to be his masterpiece, and *Hastenbeck* (1899). His collected works were ed. by H. Klenum (3rd ed., 1935). See life by W. Herz, 1926, and F. Hartmann, *Wilhelm Raabe, Gedanken und Erinnerungen*, 1927.

Raamsdonk, com. in N. Brabant, Netherlands, 10 m. N.W. of Breda. Pop. 6000.

Raasay, is. of Inverness-shire, Scotland, close to the is. of Skye. It has rich deposits of iron ore. Length 12 m.; breadth 1 to 3 m.

Rab, see ARBE.

Rabanus (Hrabanus, or Rhabanus) **Magnentius 'Maurus'** (c. 776-856), Ger. Benedictine savant and prelate, of Fr.

parentage, *b.* at Mainz. He studied at Tours under Alcuin, returning to Fulda in Hesse (801), and founding there the first public convent school in Germany. He was made abbot (822-42), and became archbishop of Mentz (Mainz) in 847. He condemned Gottschalk (848) for his views on the doctrine of predestination. *R.* wrote commentaries on the Bible, martyrologies, homilies, and poetry, including the *Veni Creator Spiritus*, and was a prominent scholar of his era. See his 'Opera omnia' in J. P. Migne's *Patrologia* and *Latinae Cursus Completus* (vols. cxi.-cxli.). See also the studies by T. Spengler, 1856; A. Köhler, 1870; and E. Dümmler, 1898.

Rabat: 1. (*R'bat et F'tah*, camp of victory), cap. and seaport of Morocco (W. coast), N. Africa, (Gharb prov., opposite Sali (Sallee, Sbu), serving as the port of Fez, 110 m. W. Textiles, carpets, and pottery are manufactured; other exports are wool, skins, wax, cork, slippers, and beans. A bar at the mouth of the Bu-Regreg makes the entrance to the port dangerous. It was founded in 1190, and contains barracks, an arsenal, and an aqueduct. The most important feature is the half finished tower, 143 ft. high. The ruins of the anct. Shella or Sahu Colonia are close by, with tombs of the Almohade and Marinide sultans. *R.* is an educational centre, and has an Institut de Hautes Etudes Marocaines, a school formerly maintained by the It. Gov., and the Institut Scientifique Chérifien, for research work. In 1928 teachers' training courses were started at the high schools for boys and girls. *R.* is on the route of the air service between Toulouse and Casablanca. There are modern port installations. During the allied landings in N. Africa, in the Second World War, Amer. forces occupied *R.* on Nov. 11, 1913, and the tn. became a base for the allied advance. Pop. 57,000. 2. Suburb of Mdina (q.v.), Malta, stretching along the spur from the fortified walls of that anct. tn. It covers much of the site of the Rom. city, and has various relics of that period, including the excavated Rom. villa, which, partly restored, is now a museum. The chief anct. monuments are the series of catacombs in which the dead of all periods have been buried. There are many churches. The par. church of St. Paul was founded in 1575 above the Troglodyte Church, which may have been one of the earliest places of Christian worship in the is. *R.* has a fine series of monasteries. Chief of these is the Dominican, with a baroque church and a fine cloister of late sixteenth-century date. The Augustinian has a church designed by Jerome Cassar, engineer to the order at the time of the great siege and creator of many of the great buildings of Valletta. The Franciscans also have baroque

churches. The approach to the tn. under the walls of Mdina was ornamented by eighteenth-century grandmasters with fountains; near by are the tribunes, from which they watched horse-racing along a lane below. In the W. hills is Verdala Palace, 1586, a fortified tower, which forms the summer residence of the governor of Malta. On the hill of Mtarfa is a military hospital and barracks. R. is a large par., covering much of the lonely W. uplands scarred with anct. rock-tombs and troglodyte dwellings, many of which are still occupied. The high-perched eighteenth-century church of the Immaculate Conception looks out over the finest prospect in Malta.

Rabaud, Henri (1873-1949), Fr. composer, b. in Paris. He learned composition under Massenet, and in 1884 won the Grand Prix de Rome with a symphony and an oratorio entitled *Job*. He is best known by his operas, particularly *Méfistopheles*, first performed in 1911 at the Opéra-Comique, and *L'Appel de la mer*, based on J. M. Synge's *Riders to the Sea*, also first performed at the Opéra-Comique. He composed three other operas, *La Fille de Roland* (1904); *Roland et le mauvais garçon* (1934); and *Marine* (1947). *Eclogue*, which was suggested by Virgil's *First Eclogue*, and *Divertissement*, on Russian themes, are among his instrumental works. He also wrote two symphonies, film music, songs, etc. He was director of the conservatoire from 1920 to 1941, succeeding Gabriel Fauré in the post, and was also conductor at the opera.

Rabaul, chief port of the Australian mandated ter. of New Guinea, Pacific Ocean, in N.E. New Britain, with a fine land-locked harbour. The harbour may once have been a great volcanic crater, which became broken at one side, and consequently is connected with Blanche Bay. It is deep and offers excellent protection for ships of any size. About the harbour lies a semicircle of mts., of which The Mother and The Daughters are a part, and in fact the tn. of R. lies at the foot of The Mother. It was estab. in 1910 by the Germans.

R. is merely a vil., but in these remote is., with their small pop. of white officials, traders, and planters, it is a place of some importance and almost the only one possessing W. amenities. In June 1937 most of R. was threatened with destruction by an eruption of the volcanoes Mother and N. and S. Daughters. These eruptions covered the tn. with mud and forced the surviving inhab. to flee, and the authorities then sought some better location for the archipelago's headquarters, the administration moving to Salamaua in 1938. New Guinea was captured on Jan. 23, 1942, by the Jap., who surrendered to the Australians on Sept. 13, 1945, but R. had been eliminated as a base by June 1944. In 1947 the Australian minister for external ter. announced that Kokopo was to be the administrative cap. Pop. (1930) 83,000 (Europeans 26,000; natives 57,000). Present pop. (non-indigenous) 4700. See also under PACIFIC CAMPAIGNS IN SECOND WORLD WAR.

Rabba, see under NUPE.

Rabbet, or **Rabate**, groove or slot cut along the edge of a board to receive the edge of another board or a tongue. See JOINTERY; CARPENTRY.

Rabbi (Heb., 'my master'), title given to teachers of the law among the Jews. In N.T. times its use was not restricted, but in the course of the first century A.D. it became restricted to the president of the Sanhedrin if he were of the family of Hillel. After the destruction of the Temple, and the rise of the Rabbinic schools, it finally became extended to all those authorised to decide legal and ritualistic problems.

Rabbi ben Ezra, see IBN EZRA.

Rabbit (*Lepus cuniculus*), herbivorous rodent, which, by its extreme fecundity, its great adaptability, and the decrease in its natural enemies, has spread rapidly and widely in temperate zones of the world. In Australia control has been, and is, costly, although cold-storage developments have made possible a large export trade in Rs. for the table. The wild R. resembles the hare but is smaller, with shorter head, ears, hind legs, and feet, is greyer in colour, and lacks black tips to the ears. Rs. are gregarious and promiscuous, burrowing extensively in the soil. They start to breed at about six months. Gestation lasts twenty-eight days. There are four to eight litters in the year with three to nine young per litter, born almost naked, blind, with closed ears, and completely helpless. In Great Britain young are born the year round, the largest litters in summer and the smallest in winter. There is apparently a pop. cycle also, increase, abundance, and decline taking five to seven years. In agriculture the R. ranks second only to the rat as a pest. Destruction is a legal obligation. The most effective methods are: (1) trapping, snaring, and ferreting in autumn and early winter, followed by a blocking of holes; and (2) gassing, by placing calcium or potassium cyanide powder in all re-opened holes. Under domestication Rs. may be kept as pets or bred for exhibition, fur, or for meat. Domestic Rs. are larger than wild Rs., more variable in colour and in features, such as pendent or lop ears, and length of coat.

Rabbit-keeping.—Rs. are kept commercially for meat production, fur, and pelts. For meat large cross-breeds such as Flemish Giant and Belgian Hare may be kept, but it is more profitable to rear dual-purpose breeds for meat and fur. The best breed for meat is the Chinchilla, which also gives a valuable skin or pelt. The best fur breeds for pelts are Rex varieties such as Chinchilla Rex, Lynx Rex, Seal Rex, Sable Rex, Havana Rex, and Lilac Rex. The pelts are more valuable than the meat carcasses. The long-coated Angora is excellent for wool, for which there is an unsatisfied demand. The yield averages 12 to 14 oz. yearly per rabbit, the useful life being three years. Rs. need constant attention, twice daily feeding, and once weekly cleaning-out. Feeding is economical, as the food consists largely

of waste leafy greens and roots (brassica leaves, carrots, turnips, pea haulms, red clover, chickory, etc.) and only needs the supplement of hay, straw, or cooked potato-and-bran mash in times of shortage. Food should be fresh, fed frequently and in small amounts, if Rts. are to thrive well. The size of the unit should be regulated by amount of food economically available in winter, but should include not less than six breeding does to be worth while, yielding about ninety Rts. annually. Housing consists of breeding hutches with compartments 27 in. wide, 22 in. deep, and 42 in. long; colony hutches such as small sheds, allowing 2 sq. ft. of floor space per R.; and finishing hutches with compartments 18 in. wide, 17 in. deep, and 22 in. high. Hutches should face S. or S.W., but be shaded from hot sun and sheltered from draughts. Breeding begins by mating up early in the year, late Jan. or early Feb., and three litters are usual, spaced throughout the year. Young Rts. are weaned at four to eight weeks, segregated as to sex, and placed in colony hutches. At about four and a half months bucks need to be placed in single hutches for finishing and to prevent damage to fur by fighting; the does need moving at about five to six months for finishing. Although valuable for their meat, the greater return comes from their pelts, and the R. should be pelted when in its best coat.

See J. Stimpson, *The Wild Rabbit*, 1908; R. Byng, *Angora Rabbit-breeding*, 1926; Ministry of Agriculture, *Modern Rabbit Keeping*, 1941; G. A. Townsend, *Practical Rabbit Keeping*, 1941; C. J. Davies, *Rabbit Keeping*, 1942; F. W. Jones, *The Rabbit*, 1944; and L. R. Brightwell, *Rabbit Rearing*, 1941.

Rabbit Berry, see SIKKHERDIA.

Rabelais, François (c. 1490 c. 1553), Fr. satirist and humorist, b. at Chinon, in Touraine. He was trained for the religious life by the Franciscans, having been, according to the story, at the convent school of La Baume, near Angers, with the Du Bellays. In 1519 his name is found signing a purchase of the monastery of Fontenay. In 1521 he was licensed to be transferred to the Benedictines at Maillezeais, and in 1530 gave up the regular for the secular priesthood. In 1531 he studied medicine at Montpellier, and later at Lyons, where he ed. works of Hippocrates and Galen. In 1532 he re-edited a popular medical romance chronicling the deeds of the great giant Gargantua (see below). In 1531 and 1535 he was at Rome in the suite of Cardinal Jean du Bellay, ambas. to the papal court. He obtained a papal licence to return to the Benedictines, and became a canon of St. Maur. He apparently studied medicine in various univs., and during the suppression of heterodoxy by the Sorbonne in 1516 he fled in Metz. In 1550 he returned, and obtained the curacy of Meudon, near Paris.

Works. As has been seen, R. ed. or re-edited in 1532 a book entitled *Les Grandes et Inestimables Chroniques du grand et enorme géant Gargantua*, which must be

distinguished from the later *Gargantua*, that formed the first part, but was probably written later than the second part (*Pantagruel*, the adventures of Gargantua's son) of his great work. *Pantagruel* appeared in 1533, was written by 'Alcofribus Nasier,' an anagram of F. R. Gargantua was pub. in 1535. In 1542 *Gargantua* and *Pantagruel* were pub. together in a revised ed., and in 1546 a third part came out. A fourth part appeared in 1552, and in 1562, nine years after R.'s death, came a fifth, of which the authenticity has been questioned, though it is now regarded generally as in essence by R., though possibly ed. and revised by another hand. Gargantua is the giant son of a giant father, Grandgousier. The first part tells of his education, which is a satire on the earlier teaching and an epitome of the new humanistic education; the abbey of Thelema is estab. on a model the exact reverse of the degraded monasticism of which R. was a devoted opponent. In the second book we are introduced to Pantagruel, Gargantua's son, his education and his meeting with Panurge, the beloved vagabond, a truly Falstaffian character, composed of wit, humour, race, and common sense. The other parts deal with the voyages in search of the lost 'Pantagruelion,' usually taken as an allegory of humour, and of the Oracle of the Bottle which answers with the enigmatic solution *Tringa* (drink). The voyages give a satire on every side of contemporary life and culture. This marvellous feast of rich humour and satire, and of profound human sympathy, educational ideals, and learning, is to modern minds defused by its obscenity and grossness, an essential, it must be remembered, to the humour of the Middle Ages and later. It is frank and open, and has not the prurient nastiness of eighteenth-century wit and satire. R.'s writings reflect the struggle of the Renaissance against the Church, and their improbability and disproportion are but a cloak to cover his attacks. His characters are simple and unrefined. His doctrine may be summed up as advocating the development of both mind and body, and his rule of conduct was *Fay ce que vouldras*. The exuberant humour and rich epic life of his *Gargantua* and *Pantagruel* doubtless have a deeper meaning than appears on the surface and R. himself tells the reader that he must 'break the bone in order to suck the marrow' if he wishes to find the hidden truth! In the same passage, however, he alludes to the 'doctrine absence' and 'mycteres horribles' in his story, but this bombast indicates plainly that he is jesting, particularly at the mania of the Middle Ages of trying to interpret all things allegorically. R. relates much merely out of love for his theme, especially the coarse jests and obscenities with which his work abounds, and those who seek some esoteric meaning here will seek in vain; and the opinion that R.'s book is a complicated puzzle cannot be too much guarded against. His style is racy and picturesque, full of original imagery, but his power of verbal

invention beguiles him and then his language becomes a verbal feast of metaphors, neologisms, latinisms, synonyms, and proverbs jumbled together in indigestible confusion. Great writer as he is, R. is quite devoid of any feeling for beauty. The word 'Rabelaisian' connotes writings marked by exuberant imagination and language and coarse humour and satire. The great Eng. trans., a classic in its way, is that of Sir Thomas Urquhart, 1653, completed by Motteux. It has been issued in Everyman's Library. The best Fr. ed. of R.'s works is that of Marty Laveaux, 1868-1903. See Sir W. Besant, *Rabelais*, 1879; L. Sainéan, *La Langue de Rabelais*, 1922-23; S. P. Putnam, *Rabelais: Man of the Renaissance*, 1929; and lives by A. France, 1930, and J. C. Powys, 1943.

Rabener, Gottlieb Wilhelm (1714-71), Ger. satirist, b. at Wachau, near Leipzig. In 1741 he entered the office of the tax-collector at Leipzig. In 1763 he went to Dresden. He wrote for most of the popular periodicals, including the *Bremer Beiträge*. His *Sammlung satirischer Schriften* (1751-55), trans. as *Satirical Letters* (1757) are mildly satirical, marked by clearness, purity, and force, but somewhat marred by 'direct irony,' according to Goethe's criticism. See the ed. by C. F. Weiss, 1777; P. Richter, *Rabener und Liscow*, 1884; and study by W. Mühlhaus, 1908.

Rabia I. and Rabia II., months of the Islamic calendar. For the Hegira year 1369 R. I. corresponds to Dec. 22, 1949-Jan. 20, 1950, and R. II. to Jan. 21, 1950-Feb. 18.

Rabies, or Hydrophobia, fear of water. This name is given on account of the spasm resulting from an attempt to drink, owing to the extreme irritability of the muscles of the neck concerned in swallowing. So irritable is the neck that the mere fact of blowing upon it will bring on the spasm. R. is contracted chiefly from dogs, but appears also in the cat, fox, skunk, and other animals, which come in contact with, or bite, humans. R. due to the wolf is particularly fatal, probably on account of the ferocity of the animal's attack, which is especially directed to the throat and face of its victim. Although, in medical language, there is no 'positive' proof of the presence of a virus, there is extreme probability that R. is due to an ultra-microscopic organism, which is so small that it can pass through a filter. Owing to the popular dread of the disease the legislature of the United Kingdom has permitted the muzzling of dogs, so that R. is practically extinct at the present time. As the result of similar measures in other countries and the estab. of Pasteur Institutes, R. is gradually being stamped out throughout the world. In the case of an animal suspected of being able to convey R. a definite diagnosis should be made, by examining the animal, or its head, at a Pasteur Institute, and the person bitten should receive preventive treatment. There is a probability, amounting almost to certainty, that R. will not result from a freely bleeding

wound. Moreover if the wound is treated with an antiseptic fluid R. is practically impossible. As an additional measure of precaution, however, stronger applications, or even the actual cautery, may be used by a medical attendant.

Rabisino, Tommaso da, see MODENA.

Rabshakeh, title given in the O.T. (2 Kings xviii., xix.; Isa. xxxvi.-xxxviii.) to the officer sent by Sennacherib to demand from Hezekiah the surrender of Jerusalem.

Rabutin-Chantal, Marie de, see SÉVIGNÉ. MARQUISE DE.

Racalmuto, tn. in the prov. and 12 m. N.N.E. of Girgenti, Sicily; has salt, sulphur, and quick-silver mines. Pop. 13,300.

Racachout, Arab word for a farinaceous food prepared from the acorn of the Barbary oak (*Quercus alicata*). The Arabs sweeten it and use it as a form of chocolate.

Raconigi, tn. in the prov. of Cuneo, Italy, on the Meira, 21 m. S. of Turin; it has manufs. of silks, woollens, and shoes. Pop. 8500.

Raccoon, or 'Coon (*Procyon*), genus of carnivorous animals allied to the bears. The common R. (*P. lotor*) ranges over the greater part of the U.S.A., though more plentiful in the S. states. It spends the day in hollow trees, not leaving them until nightfall to hunt for food, which consists largely of young birds, small animals, and also molluscs and other aquatic creatures. It is a handsome animal, resembling an arboreal fox, about the size of a large cat, and an excellent swimmer. The fur is brown in colour, and is long and thick, and consequently valuable. The tail is bushy and about 10 in. long, and is ringed with black and white. The muzzle of the head is sharply pointed, and the ears are small and round. The R. and the opossum are hunted at night with a pack of dogs trained to their pursuit, the R. being capable of a good pace, and making game fight if overtaken on the ground. The crab-eating R. (*P. cancrivorus*) ranges from Panama throughout a large part of the S. Amer. continent. Its fur is shorter than that of the common R., and its general shape more slender.

Race, see ETHNOLOGY; SPECIES.

Race, Cape, see NEWFOUNDLAND.

Racehorse, see HORSE; HORSE-RACING.

Raceme, inflorescence in which the elongated rachis bears pedicels of equal length, each with a flower.

Race-meetings, see HORSE-RACING.

Racemic Acid, $C_4H_4O_6.H_2O$. optically inactive form of tartaric acid. It may be obtained by evaporating a solution of the two optically active modifications of tartaric acid, dextrotartaric acid and levotartaric acid. The dextro-rotatory and levo-rotatory forms compensate each other in the product, which has therefore no action on the plane of polarisation, and is alternatively known as *d-l-tartaric acid*. R. A. melts at $201^\circ C.$; its crystals show some difference in form from those of *d*- and *l*-tartaric acid, but chemically they are identical. Racemates can be formed with various bases; but in the case of the

sodium ammonium salt, if it be allowed to crystallise at a temp. below 27° C., the resulting crystals can be sorted into the dextro- and levo-forms. R. A. may be synthesised by the action of moist silver oxide upon dihydrosuccinic acid: $(\text{CHBr.CO}_2\text{H})_2 + 2\text{AgOH} = (\text{CHOH.CO}_2\text{H})_2 + 2\text{AgBr}$.

Rachel, younger daughter of Laban, sister of Leah, and chosen wife of Jacob (Gen. xxix.). Jacob was deceived by Laban into marrying Leah to avoid the stigma of the younger sister marrying before the elder. R. was also given him on condition of service. R. for long remained childless, but at length she bore Joseph. The two sisters stood by Jacob in his dispute with Laban and accompanied him in his flight, R. carrying off her father's teraphim (images) (Gen. xxxix.). During their journey from Bethel to take up their abode in Hebron R. died in giving birth to Benjamin (Gen. xxxv. 16-20). There Jacob set up a monument over her grave. R.'s tomb, a white-domed sanctuary, is shown to-day on the W. side of the road from Jerusalem to Bethlehem. This is an almost certain site, and it is venerated alike by Christians, Jews, and Muslims.

Rachel, Elisa (1821-58), pseudonym adopted by Elizabeth Félix, Fr. tragic actress of Jewish descent, b. at Munt, Aargau, Switzerland. At the age of nine she was singing in the streets of Paris, where she came under the notice of Choron, founder of the conservatoire, who took her as a pupil. Her dramatic gifts proved even greater than her vocal, and in 1837 she made her debut at the Gymnase in *La Vendémme*. The following year she appeared at the Théâtre Français in Cornuillon's *Horace*. Her two greatest triumphs were achieved in Racine's *Phèdre* and Scribe and Legouvé's *Adrienne Lecouvreur*, in 1843 and 1849 respectively. She met with equal success in her tours abroad, especially in England and Russia, her popularity waning only in 1855 on the advent of Adolphe Ristori. See lives by Mrs. A. Kennard, 1885; F. H. Gribble, 1911; and J. Agate, 1928; and Matthew Arnold's three sonnets.

Rachitis, see RICKETS.

Rachmaninov (Rakhmaninov), Sergei Vassilievich (1873-1943), b. at Oneg, Novgorod, of the old Russian landed gentry, his father being a retired cavalry officer, one of the Moscow school of musical composers and a virtuoso pianist, pupil of Zverev, Taneev, Arensky, and Silioti. From the age of nine to eleven he studied in St. Petersburg Conservatoire, afterwards at Moscow Conservatoire. Arensky's harmony lessons proved to be a great help to him and, after a few years, he began to give music lessons for a living. He composed an opera, *Aleko*, for his final examination, obtained the gold medal in 1892, in which year Tchaikovsky helped him to produce *Aleko* in the great Moscow theatre. He taught at the Maryinski Institute in Moscow, 1893-96, and conducted private opera in Moscow for Mamonov, 1897-98. The failure of his first symphony, when played in St. Peters-

burg, appears to have greatly depressed him; but in London in 1899 he recovered his spirits when he played sev. of his pianoforte pieces, and conducted his fantasia for orchestra, *The Rock*. But on his return to Moscow his old despondency returned until 1901, when he was cured by treatment. It was then that he wrote his Second Concerto in C minor, the Preludes for Pianoforte, and some twelve songs, which last were written in great haste to earn money for his honeymoon. He conducted the Moscow opera from 1904 to 1906, and then came two years in Dresden, with touring intervals. In Dresden he composed his second symphony, E minor, the first sonata for pianoforte, the Symphonic Poem for orchestra (*The Isle of Death*), and the third concerto for pianoforte and orchestra. He was vice-president of the Russian Musical Society, 1908-11. His second symphony was first performed at Leeds in 1910, R. himself conducting. After the Russian Revolution he settled in the U.S.A., where he worked as a pianist and conductor. His work also includes some excellent chamber music, and a quantity of smaller vocal and instrumental pieces. As a pianist R. stands in the very first rank. As a composer his more personal works are saturated with beauty to an extent too obvious for some tastes. Yet, as in the third symphony, there is another quality of resignation and bitterness. His strength lay less in the harmonic than in the melodic field. See O. von Riesemann, *Rachmaninov's Recollections*, 1934; W. Lyle, *Rachmaninov*, 1939; W. R. Anderson, *Rachmaninov and his Pianoforte Concertos*, 1947; and J. Culshaw, *Sergei Rachmaninov*, 1949.

Racial Distinction, see COLOUR BAR.

Racine, Jean (1639-99), Fr. dramatist, b. at La Ferté-Macou (Aisne), the son of a solicitor; educated at the Collège de Beauvais, at Port Royal, and at the Collège d'Harcourt. He went to Paris, where he made the acquaintance of La Fontaine, Chapelain, Boileau, and Molière. In 1661 he attempted to get a living from his uncle, the vicar-general of Uzés in Languedoc. He married Catherine Romanet, and was made historiographer to Louis XIV. His work previous to this time was very varied. In 1660 he began his career with an ode on the king's marriage, *La Nymphe de la Seine*, and his friendship with Boileau dated from another ode, *La Renommée aux Muses*. His first play, the tragedy of *La Thibaut, ou les frères ennemis*, was acted by Molière's company at the Palais Royal in 1664 with some success. His second, *Alexandre le Grand* (1665), was produced by the same company, but later given to the rival actors at the Hôtel de Bourgogne, thus leading to a rupture with Molière. His peculiar genius was revealed in *Andromaque* (1667); this was followed by the successful comedy of *Les Plaideurs* (1668), and the tragedies of *Britannicus* (1669); *Bérénice* (1670); *Rajazel* (1672); *Mithridate* (1673); *Iphigénie en Aulide* (1674), probably his best work and a masterpiece of pathos; and *Phèdre* (1677), a particularly painful

drama. He was admitted into the Fr. Academy in 1673. His life after his marriage was affluent and happy. He had many literary friends and was for some years gentleman-in-ordinary to the king. His work during this period includes *Ethier* (1689), written at the request of Mme de Maintenon for her school-girls at St. Cyr; *Athalie* (1691), another excellent tragedy; four *cantiques spirituels* (1694); and *L'Abrégé de l'histoire de Port Royal* (1742, 1767), written in neat and clear prose. Among the best Fr. eds. of his works are those of Count G. Garnier with commentary by M. la Harpe (1807); J. L. Geoffroy (1808); Aimé Martin (1820); Paul Mesnard (1865-70; new ed., 1929); and A. France (1874). Eng. trans. by



RACINE

R. B. Boswell a, 2 vols. (1889-1890). See lives and studies by his son Louis, 1747; Marie Beyle, 1851; G. le Bidois, 1901; F. Mauriac, 1928; A. Tilley, 1933; and A. F. Clark, 1940; also M. Turnell, *Classical Movement*, 1947, and V. Orgil, *A New View of the Plays of Racine*, 1948.

Racine, cap. of R. co., Wisconsin, U.S.A., 23 m. S.E. of Milwaukee, on Lake Michigan. Its chief manufs. are boilers and agric. implements; it trades in lumber. Pop. 67,200.

Racing, see ATHLETICS; HORSE-RACING; ROWING; YACHTING, etc.

Racing, Point-to-Point, see POINT-TO-POINT STEEPLECHASES.

Rack, instrument of torture, consisting of an oblong frame of wood slightly raised from the ground. At one end was a fixed bar and at the other a movable one (sometimes both were movable). The bar was extended by a windlass until the victim's joints were dislocated, or he died, or answered the questions of his torturers. The R. was known to the Egyptians and early Gks. and Romans. The duke of Exeter is supposed to have been responsible for its introduction into England, whence it was popularly known as the 'Duke of Exeter's daughter.' It was

much used in Henry VIII's and Elizabeth's reigns, but declared illegal in 1628, when it was proposed to rack Charles Felton.

Rack-a-rock, powerful explosive consisting of potassium chlorate mixed with nitrobenzene. It is principally used in blasting operations.

Racket, Ranket, or Sausage Bassoon, obsolete instrument of the bassoon type. Its long tube was folded many times, so that its actual size seemed small.

Rackets, see RACKETTS.

Rackham, Arthur (1867-1939), Eng. water-colour painter and illustrator, son of Alfred Thomas R., Admiralty marshal. Educated at the City of London School and Lambeth School of Art. In his twenties he drew illustrations for *Fall Mall Budget* and *Graphic*. He developed a delicately fantastic style, his execution being a matter of ink lines and colour washes, and his subjects, with elves and gnomes, having a Gothic touch. He illustrated eds. of *Rip Van Winkle*, 1905; *Peter Pan*, 1906; *Ingoldsby Legends*, 1907; *Wagner's Ring*, 1910-11; Dickens's *Christmas Carol*, 1915; *Sleeping Beauty*, 1920; *The Tempest*, 1926; *Picnic of Wakefield*, 1929; *The Complete Angler*, 1931; *Andersen's Fairy Tales*, 1932; *The Arthur Rackham Fairy Book*, 1933; *The Pied Piper of Hamelin*, 1934; *Hoe's Tales of Mystery*, 1935; *Peer Gynt*, 1936, and many other books.

Rack Rent, see RENT.

Racoozy, see RAKOCZY MARCH.

Racoon, see RACCOON.

Racoonda, name given to the fur of the Coypu (q.v.).

Racquets, or **Rackets** (through Fr. *raquette* from Sp. *raqueta*, a battledore; ultimately, perhaps, connected with Arabian *rāḥāl*, palm of the hand), game played in an enclosed court with a ball by two or four persons. The early variety of the game, as described in *Puckwick Papers*, was played on courts open at the sides, and was practised only by the lower classes of the community. This game originated in Eng. jails, and was played by the prisoners against a wall. Robert Mackay, a debtor, was probably the first holder. After 1800 the game became more seriously known, and from a game of skill developed also into one of hard hitting. The racquet, with which the game is played, and from which it derives its name, is about 2 ft. 6 in. long and weighs from 8 to 12 oz., with a head almost circular in form of about 7 or 8 in. diameter, and strung with catgut. The ball, which weighs about 1½ oz., is small, round, and hard. There are no specified dimensions for racquet courts, although no great disparity is found. If the court is 60 ft. long and 30 ft. wide a white line is drawn across the floor 38 ft. from the front wall; this is the short line. From the centre of the short line a line is drawn to the centre of the back line, dividing the back portion of the court into right and left courts, while lines are drawn on the floor parallel to the short line and the side wall respectively at a distance of 8 ft. from the points where they meet, thus forming two squares known as service

boxes. The front wall is boarded for a height of 27 in. and has another line at a height of about 9 ft. the former is the play line the latter the service or cut line below which no service is allowed. Priority of innings is decided by tossing, this is a great advantage as the service often decides the game at R. and only the player who is 'in' or serving can score. The server must have one foot in the service box, and must not strike the ball twice. The ball must strike the wall above the service line and fall within the opposite court after which the server's opponent must return it above the board i.e. the play line before it has touched the floor twice. When either player fails to return his opponent's stroke or it turns off below the board either an 'out' is scored to the server or the server is 'knocked out' and his opponent serves as the case may be. Two consecutive 'faults' in serving cause the service to change hands, the service is taken alternately from the two boxes so long as one player's innings continues. In the cases of unavoidable hindrances or 'lots' (decided by the marker) the server serves again without scoring. A game consists of fifteen points or aces, when both players are thirteen he who first reached that score has three options: either 'no set' which means that the score goes on up to fifteen in the ordinary way (except that another option may arise at fourteen all) or 'set three' (game being sixteen with no further options) or 'set five' (game being eighteen with no further options). At fourteen all the first to reach fourteen has two options: 'no set' (i.e. one point only) or 'set three'. When four players are engaged the receivers stand one in each court while the server's partner stands by the door in the middle of the back wall. At the beginning of every game the serving side has 'no hand' only.

It is a fast-paced racket striking hard and in America it is also known as Bombay (Calcutta, Madras and Rangoon). Since unfortunately it is not a cheap game and the strains and stresses of the twentieth century have led to a decline in its popularity. If it such a magnificent game has not been allowed to lie out is primarily due to the efforts of the Tennis and Rackets Association combined with those of the public schools in England. See also *SQUASH RACQUETS*. See also *A. L. L. Tennis Rackets* is *Times* 1910. A. D. *The Racket Game* 1930. Lord Aberdare (ed.) *Rackets Squash Tennis Rackets and Badminton* 1933.

Radach, Radak, or Ralok see MARSHALL ISLANDS.

Radar a slogan derived from the phrase radio detection and ranging and synonymous with radiolocation. Both words were coined to denote a process whereby distant objects are detected and their directions and ranges measured by means of wireless wave echoes reflected back to detecting apparatus which is often also the source of the wireless waves. The rapid development of R was largely due to its importance in war and in the

years preceding 1939, and during the Second World War enormous progress was made. Fortunately for the Allies then R was throughout the whole period, substantially in advance of that of their enemies and this was certainly a major factor and possibly a vital one in their success. The uses of R in peace, if less spectacular are likely to be as numerous as in war and it has already proved of great value for the navigation of ships and commercial aircraft at night and in foggy and cloudy weather and in dock and harbour control (see AIR NAVIGATION and NAVIGATION).

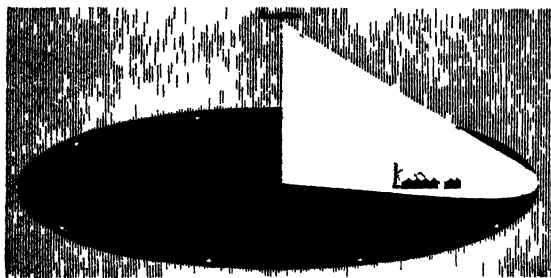
The Principles of Radar. The principles on which R is based are simple. The human eye sees an object illuminated by a beam of light; the rays of light are reflected from the object to the eye. Such rays do not penetrate mist, cloud or smoke however and in clear weather the object may remain invisible at relatively small distances merely because insufficient light is reflected. Wireless waves travel at the same speed as light (186 000 m per sec.) are unaffected by atmospheric conditions and if of sufficiently short wave length, are reflected by objects just as is light. Hence, if a narrow beam of short waves is sent from a transmitter in the direction of a distant object a reflected group of waves will return to the starting point after a time equal to that required for waves to travel to the object and back again. Observation of the direction from which the echo comes shows the direction of the object and if the delay between transmission and the arrival of the echo is measured the range is also known. The operation of the apparatus is unaffected by darkness or the state of the weather and since the incoming signals can be highly amplified it can be used at ranges up to several hundred miles.

To be effective the beam transmitter must use short wave lengths certainly not more than a few metres and preferably only a small fraction of a metre. One reason for this is that long waves can only be concentrated into a narrow beam by the use of transmitting antennae of prohibitive size and if the beam is broad only a small fraction of it will impinge on and be reflected from an object such as a distant aeroplane. Of equal importance parts of a wide spreading beam will be simultaneously reflected from each of a group of aeroplanes flying together so the echo will not reveal whether one or several are causing it. Moreover it is only short waves can provide accuracy of vision. If only a weak beam is needed the production of short waves presents no special difficulty, but since a distant aeroplane reflects only a minute fraction (perhaps only a few parts in 100 000 billion) of the transmitted energy back in the direction of the receiver the beam must be intense. In the early years of the war the difficulty of generating sufficient power limited the wave length to 100 metres. Later the development of a device called the cavity magnetron enabled much shorter waves to be used with a marked gain in utility.

as well as other advantages. The equipment, however, must allow for the reception of the weak echo as well as the transmission of a powerful beam. For this and other reasons the pulse system was adopted at an early date. With this system the radio frequency oscillator is coupled to the antenna for a brief period of a millionth of a second or so, during which time a short burst of waves or pulse is sent out, the receiver meanwhile being disconnected. The oscillator is then turned off sharply, is disconnected from the antenna and for about a thousandth of a second the receiver is coupled to the antenna for the reception of echoes, the receiver is now disconnected, and the process is repeated over and over again. (The pulses must begin and end sharply because of the high speed of the wireless

brief period after the electrons have impinged upon it. When an echo is received the beam of electrons is diverted a short distance vertically, causing a V to appear in the otherwise straight line at a point whose position depends upon the time lag before the receipt of the echo and hence upon the range of the object causing the echo. Other types of indicator record the echoes in such a way that the illuminated parts of the face of the cathode ray tube present what is, in effect, a map showing the positions of the objects causing them, such indicators were used for bombing in conditions that precluded the use of optical bomb sights.

Radar and Air Defence—When the Luftwaffe launched in 1940 its heavy daylight raids on Britain the Germans were in command of a chain of air bases situated



RADAR PRINCIPLES OF ITS SCANNING MECHANISM

An aerial mounted in a position that can rotate on its axis in the horizontal plane, like a fan, is very much in the horizontal plane. It rotates on its axis every second so that the face of a clock. The reflections from the face of a clock. The reflections from the face of a clock. The reflections from the face of a clock.

of the ground produces a beam of waves that sweeps over the ground like the hand of a clock. The reflections from the face of a clock. The reflections from the face of a clock. The reflections from the face of a clock.

waves, the accurate timing of the echo and hence the measurement of the range would otherwise be impossible. Men while the appropriate portion of space being scanned by the beam that the beam is directed in turn to all parts of this space. The scanning, usually involves rotation of the antenna and since to provide a sharply defined beam the dimensions of the antenna must be many times as great as the wave length, the movement is only possible in a confined space such as that available in aircraft if the wave length is very small. The echo signals received after amplification are registered by the indicator. In one form of indicator a beam of electrons is directed on to the face of a cathode ray tube, here, if no echo is received the beam impinges successively upon successive points along a horizontal line although the beam impinges in turn on the various parts of the line producing a succession of illuminated points, the whole line appears bright because of the persistence of vision and because the coating of the tube continues to emit light for a

only a few minutes flying time from the target. Unless some form of warning system had been in operation to allow the defence to be alerted long before the bombers approached the coast, insufficient time would have been available for fighters to take off, climb and intercept and disperse the invaders. In fact, in 1940, it would have been impossible. Fortunately, however, a series of ground stations, begun many years earlier, were already functioning and they supplied information not only of the approach of raiders and their course but also when and where they were forming up prior to the actual raid. The fighters could therefore take off in good time and find their way to the best positions for interception. Probably because their own R was far inferior, the Germans underestimated its value and made no serious effort to put the stations out of action. The heavy losses inflicted on the bombers caused the Germans to change their tactics and resort to night attacks. With the apparatus then in use the interception of night bombers by fighters posed additional problems for the defence. In

during the darkness, and greatly reduced the risks of collision.

It, moreover, was a vital factor in the attack upon submarines, particularly by aircraft, and its use caused a great decline in the morale of the submarine crews. Although U-boats, to avoid detection by searching aircraft, could cruise submerged during daylight, they had to surface at some time to recharge their batteries. During the early years of the war they ran little risk in doing this at night, but as R. developed it became practicable for aircraft to search wide areas during darkness, while the same R. guided them in high-speed attacks before their prey could submerge. The effectiveness of these attacks convinced the Gers. that R. was being employed, and in 1912 they captured intact one of the longer wave R. sets then used by coastal command. Apparatus was installed in the U-boats to enable them to detect the R. beam, which now served as a warning, and allowed them time to submerge. The sense of security engendered in the U-boat crews by their detector was rudely shattered when the Allies put into service a new type of R. working on much shorter wave-length (one-tenth metre), and incapable of detection by the Ger. apparatus; in three months of 1943 nearly 100 U-boats were sunk, chiefly by aircraft. Only after a prolonged delay did the Gers. discover what means of detection was in use by the Allies, and the menace of the U-boats steadily declined during the remaining period of hostilities.

Radar and Naval Warfare.—R. has played a large part in solving the special problems of the defence of warships and aircraft carriers against air attack. It has to a large extent revolutionised battles between naval vessels themselves. By its use a fleet can detect the presence of other vessels at night or in fog, can identify them as enemy, engage, and sink them without ever seeing them except as signals on the fluorescent screens of the R. apparatus.

Radar and the Air Offensive.—As a navigation aid in the early Brit. bombing of Germany, radio pulse signals were used, but as the system did not make use of echoes it could perhaps not be classed as R. Two ground stations in England sent out pulses, and the aircraft carried apparatus that picked up these signals, and after a brief, and accurately timed delay, emitted other signals in response. From the delay period between the time when a pulse was sent from, and the response was received at each ground station, the distance of the aircraft was known. The accuracy was such that the controller at the ground station knew the position of a bomber over the Ruhr to within a few yards, and could signal to the bomber the appropriate instant for the release of bombs or target flares to serve as markers for other bombers. R. proper, using short waves and an indicator that presented a map of the ground below, was used extensively from 1943 onwards by the heavy bombers of the R.A.F. and U.S. air forces.

R. also provided valuable aid to the long-range fighters sent out to protect Amer. bombers during their daylight operations. Owing to their higher speed and inability to remain airborne as long as the bombers, such fighters could not accompany the bombers throughout their missions, but relays of fighters were dispatched to guard the bombers at various parts of their course. The difficult problem of bringing the fighters into contact with the bombers at the appropriate time and place was enormously simplified by R. which, working from friendly ter., allowed a ground controller to follow for some 200 m. the courses of bombers and fighters. With its aid enemy fighters ascending from their aerodromes to attack the bombers could also be detected, and protecting fighters could be diverted to intercept them far from the bomber stream.

Meteorological Uses.—Sometimes R. waves are refracted abnormally towards the ground, hills, and coasts much further away than usual appearing on the screen. This can occur when there is an intense inversion of temp. (increase instead of the normal decrease with height) and for a large decrease in water-vapour content with height. The necessary decrease in water-vapour content is more frequently found than the necessary rate of increase of temp., but they can both work together, as when hot dry air flows over a comparatively cool sea picking up moisture and lowering the temp. of the lowest layers, thus forming just above these layers a 'duct' with abnormal refraction of the R. beam. Such ducts have often been observed over the Mediterranean in summer when hot dry air flows from the Sahara and over the Indian Ocean during the N.E. monsoon which is also hot and dry. A. Perlot has suggested that the advance of the abnormality, which can be mapped easily on a R. screen, can thus be followed more accurately by the meteorologist than with the normal land and ship observations. With contrimetric R., echoes from raindrops can be picked up, the largest drops producing the brightest echoes; therefore rain-producing clouds, such as cumulonimbus and nimbostratus, and particularly thunderstorms and tropical cyclones or tornadoes, show themselves very clearly on a R. screen, and the movement of such important weather phenomena can be watched closely, as on a map, anywhere within 100-150 m. of the R. set.

R. is also used to measure winds at high levels. To an inflated rubber balloon, often also carrying a radio-sonde (q.v.), is attached a small R. target, sometimes consisting of a metallised nylon mesh enveloping the balloon or, more frequently, of plane metallised paper sheets or nylon nets set mutually at right angles (see figure in RADIO-SONDE article). No matter at what angle a R. beam strikes this target it will be reflected directly back to the transmitter, producing a bright echo on the screen of a receiving apparatus; its position (including height) can then be determined at any moment, and

since the balloon drifts only with the wind the velocity of the balloon is a measure of the wind strength. Since the R. beam can penetrate cloud, winds can then be measured up to very great heights regardless of the weather conditions obtaining at the time of measurement.

Astronomy.—One of the early applications of R. for astronomical purposes was to find the time that radio echoes took to return from the moon, and from this to verify the distance of the moon from the earth. The results were quite satisfactory and showed that astronomers might be able to utilise this new discovery in various ways. Its use for the detection of meteors has produced remarkable and unexpected results. Meteors are very small particles, mostly like specks of sand or smaller, which revolve around the sun in various forms of elliptic orbits—usually very eccentric—so that their velocity at the distance of the earth from the sun is about 25 m. per sec. As the earth's orbital velocity is 18½ m. per sec. the actual velocities of encounter with the earth may vary between about 7 to 41 m. per sec., but since the earth's gravitational attraction accelerates the speeds of these bodies, more especially the slower ones, the velocities lie between 10 and 45 m. per sec. Such high speeds are accompanied by a considerable rise in the temp. of the molecules of the atmosphere at varying heights—60 m. or more—and ionisation takes place. The free electrons reflect the radio-waves back to the earth and so meteors can be studied when the sky is clouded over and even by daylight. Meteors can be seen only by night, and hence if the 'radiant'—a term well known to all meteor observers—rises and sets about the times of sunrise and sunset, respectively, although there may be very extensive showers, visual observation could not detect them. A well-known shower takes place in the early morning hours, soon after the radiant rises, during the first week in May, and is known as the π -Aquarids, but it cannot be seen for long owing to sunrise soon after its activity is observed. In 1917 R. was used at Jodrell Bank, the research station connected with Manchester Univ., to observe this shower, and not only was it successful, but as the R. continued to be used during daylight, it was found that there were other meteor showers much more prolific, which had not previously been known. Throughout May, June, July, and Aug., other daylight showers of great intensity were discovered of which nothing had been suspected before the use of R., and subsequent work in later years has confirmed the earlier discoveries. It is now possible to study meteors by R. by night or by day, and further research on these minute specks, many hundreds of millions of which strike our atmosphere every day, may yet assist the cosmologist in his speculations regarding the origin of the solar system, on which there is still no consensus of opinion. In addition, the use of R. to study cosmic rays may some day enlighten us on some of the mysteries of these enigmatic, in particular

on the seat of their origin—in stars, or in the far off nebulae or in interstellar space.

See R. W. Hollows, *Radar: Radio-location simply explained*, 1916; Physical Society and Royal Meteorological Society, London, *Meteorological Factors in Radio-wave Propagation*, 1916; and I.M.S.O., *Science of War*, 1918.

Radautz, tn. in Bukovina, Rumania, 32 m. S. of Czernowitz. It has a cathedral, and there are machinery, glass, and paper works. Pop. 17,000.

Radclyffe, Ann, née Ward (1761–1823), Eng. novelist, b. in London. She pub. her first book, *The Castles of Athlin and Dunbayne*, in 1789, and it deservedly attracted little or no attention. Her next story, *A Sicilian Romance* (1790), was much superior, and Scott said it was the finest modern Eng. example of the poetical novel. This was followed by *The Romance of the Forest* (1791); the more celebrated *Mysteries of Udolpho* (1794); and *The Italian* (1797), an impassive novel in which the demoniac villain Schederio plays his part. Her novels are historical only in a negative sense; for whether the background be the age of chivalry or that of the Inquisition, it is always the manners of her own time that are reproduced. See C. F. MacIntyre, *Ann Radcliffe in Relation to her Time*, 1920, and A. S. Wieten, *Mrs. Radcliffe her Relation towards Romanticism*, 1926.

Radclyffe, or Radclyffe, James, see DERWENTWATER, EARL OF.

Radclyffe, John (1650–1711), Eng. physician, b. at Wakefield. He was educated at Univ. College, Oxford, became a fellow of Lincoln College, Oxford, in 1669, and began his medical practice in that tn. In 1684 he removed to London, and was very successful. In 1686 he became physician to the Princess Anne, but about 1695 was displaced by Wm. Gibbons. He bequeathed funds which provided for the building of the R. Observatory and Institution, Oxford, the enlarging of St. Bartholomew's Hospital, London, and for travelling fellowships in medicine. The R. Camera, the reading-room of the Bodleian Library (*q.v.*), bears his name.

Radclyffe, tn. of Lancashire, England, on the Irwell, 7½ m. N.N.W. of Manchester. The chief industries are cotton-weaving, finishing and dyeing, paper-making, and engineering. Pop. 27,100.

Radeberg, tn. of Saxony, Germany, 11 m. N.E. of Dresden. It manufs. paper, glass, nails, and sales. Pop. 15,800.

Radegunde, St., Frankish queen, daughter of the pagan king of Thuringia. She was baptised, educated, and eventually married to Clotaire I., the Frankish king. She left him after much ill treatment, culminating in the murder of her brother, and ultimately founded the nunnery of the Holy Cross at Poitiers.

Radek, Karl (b. 1885) (otherwise Karl Sobelsohn), Russian revolutionary, b. at Lvov, then in Austria-Hungary. Imprisoned in Russia, 1905–6, he was active in Germany as an anti-militarist during the First World War, and later resided in Switzerland. In 1917 he was in Sweden

as a Bolshevik agent. In Germany in 1918 he was among the Spartacists; he was imprisoned there, and returned thither in 1922. In 1926 he was rector of Sun Yat Sen Univ. for Chinese in Moscow. In Jan. 1928 he was banished with Trotsky, and sent to the Ural, but in 1930 he was reinstated. In 1937 he was tried with others for conspiracy and sentenced to ten years' imprisonment, but was released in 1941 in order that his talent for skilful propaganda might be employed.

Radetzky, Johann Josef, Graf von Radetzky (1766-1858), Austrian soldier, b. at Trerbnitz in Bohemia, and joined the army as a cadet in 1785. He served in the Turkish and revolutionary wars, and was made a colonel in 1799. In 1805 he was promoted to major-general, and in 1809 lieutenant-field-marshal. He took part in the battles of Trebbia, Novi, Marengo, Aspern, Wagram, Leipzig, etc. His chief claim to fame rests on his masterly defence of the Quadrilateral (q.v.), and his subsequent crushing victories at Custoza and Novara over Charles Albert, king of Sardinia. See life by E. Schwall, 1938.

Radevormwald, tn. in the Rhineland, Germany. Mannf. include steel goods, woollen goods, and general hardware. Pop. 13,600.

Radhakrishna, Sir Sarvepalli (b. 1888), Indian philosopher and educationist in England. Educated at Madras Christian College, he was prof. of philosophy, Presidency College, Madras, 1916-17; George V. prof. of philosophy, Calcutta, 1921-31 and 1937-41; and vice-chancellor of Benares Hindu Univ., 1939-48. R. was also a member of the international committee on intellectual co-operation of the League of Nations, 1931-39, a fellow of All Souls, Oxford, and member of the Constituent Assembly for India. Among his numerous publs. are *The Reign of Religion in Contemporary Philosophy* (1920); *The Philosophy of the Upanishads* (1924); *The Hindu View of Life* (1927); *East and West in Religion* (1933); *Eastern Religions and Western Thought* (1939); *Religion and Society* (1947); and *The Bhagavad-gita* (1948).

Radhappur, cap. of the state of R. Saurashtra, India. It is a trade centre of some importance for N. Gujarat and Cutch. Area of state 1150 sq. mi. Pop. 67,700; (of tn. 13,100).

Radial Artery, artery in which the pulse is felt at the wrist. The brachial artery on passing the elbow divides, the two branches follow the radius and ulna respectively. The former reaches the wrist near the surface, runs to the back, then forward into the palm of the hand, where it joins a branch of the ulna artery.

Radial Engine, see AERO-ENGINES.

Radiant, see under METEORS.

Radiation. The ramifications of the subject of R. extend to all branches of physical science. Whether heat, light, electricity and magnetism, matter and its properties, astronomy, or astrophysics are concerned the questions concerning R. and matter are the ultimate ones to be

answered. Since the time of Clerk Maxwell (q.v.) we have come to know that all Rs. are electromagnetic in character and that they are all propagated with the same velocity, that of light, namely 186,000 m. per sec. *in vacuo*. The Rs. that reach us from the furthest star and cause the sensation of sight on entering our eyes; the Rs. from a fire or the sun that produce the feeling of warmth; the Rs. from the sun that are known as ultra-violet light that produce the effects of sunburn, and are believed to be so beneficial to general health— all these are identical in character with the Rs. that reach the aerial of a radio receiving set from the broadcasting station. The shortest wave-length Rs. known are the cosmic Rs. They are shorter waves than the γ -rays emitted from radioactive bodies during their spontaneous disintegration. γ -radiation is the shortest wave-length R. from terrestrial sources, being of the order of 10^{-10} cm. In the scale of wave-lengths they are followed by X-rays, the hardest of which have a wave-length of the order of 10^{-8} cm., while the softest and least penetrating X-rays have a wave-length of the order of 10^{-6} cm. Ultra-violet R. from mercury arcs is of the order of 10^{-6} cm., while the ultra-violet R., the wave-length of which is just too short to cause the sensation of sight, is $4 \cdot 10^{-6}$ cm. The visible spectrum consists of R. of wave-lengths between $4 \cdot 10^{-6}$ cm. and $8 \cdot 10^{-6}$ cm., while the infra-red R. that produces a sense of warmth, but does not cause the sensation of sight, extends from $8 \cdot 10^{-6}$ cm. to waves of much greater length. The shortest wireless waves are 10^{-3} cm. long, and the longest are of the order of 10^6 cm.

In the article on SPECTRUM reference is made to the present theories of the origin of visible Rs. as well as the origin of ultra-violet and infra-red Rs., while in the article on X-RAYS the origin of that form of R. is discussed. The present state of knowledge of R. is undergoing fundamental changes because of the difficulty of reconciling the quantum theory (q.v.) with that of the undulatory theory of light (see LIGHT). It is interesting, therefore, to trace the development of the knowledge of the infra-red Rs., known as radiant heat, in this article, for this branch of R. led directly to the difficulties mentioned above. The researches of Melloni and Tyndall during the latter part of the last century revealed the fact that those Rs. from hot bodies that are responsible for producing the sensation of warmth are identical in character with ordinary light. That is so say, radiant heat obeys the laws of refraction, reflection, etc. Newton had made an attempt to determine the law governing the rate at which a body loses heat, and he discovered that the rate of cooling varied directly as the difference of temp. between the cooling body and its surroundings. Dulong and Petit subsequently discovered Newton's law to be only approximately true, but they too were really dealing with the cooling of a body under other influences besides R., such as conduction and convection. In simplifying the nature of the problem and

in concentrating on the loss of heat of a body by *R.* alone, three names stand out from all others, viz. Prevost, Stefan, and Planck. Prevost enunciated the Law of Exchanges that recognises that all bodies are simultaneously and continuously losing heat by *R.* Thus a cold object brought into a warm room is losing heat by *R.* to the room, but it is absorbing heat radiated from the room at a faster rate, and the net result is that the temp. of the cold body is raised to that of the room. Even then *R.* does not cease; the exchange still proceeds, but the body now radiates heat at exactly the same rate at which it receives it from the room and the net result is no change in its temp. In developing this law of Prevost, Ballour, Stewart and Kirchhoff were led to the consideration of the nature of the *Rs.* from bodies inside an enclosure that was impervious to heat. It follows that a stage is reached at which, by the exchange of radiant energy, all the bodies reach the same common temp. It also follows that there can be no subsequent changes of temp. within that enclosure, so that every body is receiving heat at exactly the same rate as that at which it is radiating heat. Now it is fairly well known that a black body absorbs radiant heat more readily than a white body or a polished body under identical circumstances. The black body is black because it absorbs practically all wave-lengths that fall on it, just as a white body is white because it reflects practically all wave-lengths that fall on it. But in an enclosure like the one described above it is clear that, when all temp. differences have disappeared, the black body radiates all wave-lengths that it absorbs as its temp. remains unchanged; the white body reflects and radiates all the wave-lengths that fall on it. In fact the net *Rs.* from all bodies within such an enclosure are identical and include all wave-lengths. Such *R.* is known as 'black body' or 'full' *R.* It is the *R.* that would be emitted by a body perfectly black under the same circumstances. The law of *Rs.* now sought was the law of black-body *R.*, and Stefan discovered that the *R.* within such an enclosure followed the law that now bears his name and also that of Boltzmann who established Stefan's empirical law from theoretical considerations: The rate at which a perfectly black body radiates heat is directly proportional to the fourth power of its absolute temp. (*q.v.*).

Research now proceeded rapidly, and by means of the bolometer and radiometer it was possible to examine the distribution of the radiant energy from a body among the wave-lengths in the spectrum. The result of the experimental researches could not be accounted for by the existing dynamical laws, and Planck was led to formulate the now famous quantum theory in order to account for this distribution. See T. Preston, *Theory of Heat*, 1920; G. Birtwistle, *The Principles of Thermodynamics*, 1927; and J. B. Hart, *Introduction to Advanced Heat*, 1931.

Radiator (Heating). See ELECTRIC LIGHTING AND WIRING OF HOUSES,

Electric Heaters; HEAT, Modes of Transference of Heat; HEATING.

Radical, in chem., is a group of atoms of two or more elements which take part as a whole in chemical reactions, passing from compound to compound without disintegration, yet being incapable of existing alone. Thus the *R.* methyl CH_3 does not exist as such, although the double formula $\text{CH}_3\cdot\text{CH}_3$ represents the gas ethane. *Rs.* may be acidic (electro-negative) in type, e.g. (NO_2) , (HCO_2) monovalent, and (SO_4) divalent; or they may be electro-positive as illustrated by the *Rs.* ethyl C_2H_5 , phenyl C_6H_5 , ammonium NH_4 , etc. Organic chem. is particularly associated with the chem. of compound *Rs.*

Radical, in politics, a term which came into general use as a synonym for 'Liberal,' but is capable of application to any politician or political supporter whose political creed involves some root-and-branch reform. In England the term historically applies to the political reformers of the last decade of the eighteenth century and the earlier period of the nineteenth century. The *R.* proper may be said to have been partly the product of the ideas germinating in Europe from the philosophy of Rousseau after the Fr. Revolution, and partly an inevitable outcome of the rising *ts.* The name *R.* reformers appears first to have been assumed by Hunt, Cobbett, and others of this period, who were bent on influencing the people at large in the direction of great and popular constitutional changes. By the time of the Reform Bill, 1832, the *Rs.* had gained a definite and permanent footing in the House of Commons, where they were represented by at least fifty members. From this time forward the term became gradually interchangeable with 'Liberal.'

Radio (or Wireless), as it was originally called embraced to-day a wide variety of applications which have developed since its first use for communication. Radar, *R.* frequency heating, ionospheric measurements, and television are all dependent, basically, on the science of *R.*

History. — *R.* has its origins far back as 1873 when Clerk Maxwell puts a set of differential equations which showed that electromagnetic waves could be propagated through space in a similar manner to those of light. Hertz in 1888 was able to give a laboratory demonstration of the production and detection of *R.* waves, using a Leyden jar connected to a spark gap and coil of wire as his transmitter. The simple receiver consisted of a circular brass rod with brass knobs forming a spark gap. When the Leyden jar was discharged small sparks passed between the knobs of the receiver, which was not connected to the transmitter in any physical manner. Contemporary workers were Sir Oliver Lodge (*q.v.*) and E. W. Morley, who invented the first real detector or coherer. The coherer was a tube, loosely packed with metal filings, in which two electrodes were embedded, and it was connected in series with a battery and galvanometer. The resistance of the

coherer was caused to change in the presence of electromagnetic waves and thus such waves could be detected by the change in reading shown by the galvanometer. It was, however, necessary to subject the coherer to slight mechanical vibration after each train of waves had been detected in order to separate the 'cohering' particles of metal. This piece of apparatus was soon followed by an improved magnetic detector invented by Marconi and, subsequently, by a number of mineral detectors of the permanent and semi-permanent variety (see RADIO RECEIVERS). It was not, however, until 1904 when Sir Ambrose Fleming, followed by Lee de Forest in 1907, invented the first R. valve (*q.v.*) that R. was able to advance from the limited field of spark transmitters (see TRANSMITTERS, RADIO) and simple detectors. The Fleming diode or two electrode valve could be used as a detector, and Lee de Forest added a third electrode, the grid, to produce the first triode valve. The triode valve could be used as an amplifier, oscillator, or detector, and from these beginnings the whole technique of modern R. science has developed.

Propagation of Radio Waves.—R. waves are electromagnetic waves which, when propagated, travel through space with a speed equal to that of light, i.e. 186,000 miles per sec. Their characteristics are sometimes compared with the waves in a pond when a stone is dropped into it. They travel outwards from the point of entry of the stone, travelling at a constant speed. If the initial disturbance be great the waves will be high, and if small there will be but small ripples as a result. The distance from the crest of a wave to the crest of an adjacent one is termed the wave-length. If the velocity at which the wave travels is called V metres/sec. and n waves per sec. pass a fixed point, it follows that the wave-length λ metres of each wave will be $\frac{V}{n}$, so that it is seen that $V = n\lambda$ where n is termed the frequency and is measured in cycles or, as is more usual in R., kilocycles per sec. For R. waves the relation between wave-length and frequency is given by $f(\text{Kc./s.}) \times \lambda (\text{metres}) = 300,000$, i.e. a broadcasting station operating on a wave-length of 300 metres will have a frequency of $\frac{300,000}{300} = 1000$ Kc. s.; this is often referred to as 1 megacycle, or abbreviated to 1 Mc.

Uses of Radio in Broadcasting and Communications.—The R. spectrum used for communication and other purposes extends from some 10 Kcs. at the low frequency extreme to 30,000 Mcs. at the upper limit beyond which lies the region occupied by X-rays (*q.v.*) and light-waves (i.e. they range from 30,000 metres to 1 cm. wave-length). The science of R. is normally associated with broadcasting and communications, and it was in this direction that the major developments first occurred. In this connection it is invariably applied to the conveying of intelligence beyond the limits of ordinary

sound-waves or light-signals. To do this a transmitter may use telegraphy or telephony (see MODULATION). The transmitter generates R. frequency power at a chosen frequency, and the intelligence fed to it from the programme source at the broadcasting station varies the output which is then fed to an aerial system from which it is then radiated into space (see AERIAL; BEAM WIRELESS).

Apart from spacing transmitter frequencies in the spectrum so that they interfere mutually as little as possible, different orders of frequencies in it have widely different characteristics. Those between 150 Kc./s., 285 Kc./s., and 525-1605 Kc./s., for example, accommodate broadcasting stations in the long and medium wave-bands of the familiar domestic R. set. For long-distance communication frequencies between 3 and 30 Mc./s. are employed because, in addition to the direct or 'ground' wave which can be received from the transmitter, the waves undergo reflection from the upper atmosphere, so that they are returned to earth at distances well beyond the limit of the 'ground' wave. This reflection from the upper or 'Heaviside' layer (there is, in fact, more than one reflecting layer, and these exist at different heights, although they all, under certain conditions, reflect R. waves) may take place in more than one cycle, so that world-wide communication becomes possible. These phenomena were originally discovered by amateur transmitter operators to whom the 'short waves' were assigned originally, as they were thought to be of little value for communication purposes. It is as a result of their work that world-wide communication and broadcasting (*q.v.*) by short waves owes its inception.

Ionospheric Science.—Above 30 Mc./s. the reflecting layers only behave as such during exceptional periods of ionospheric conditions, and as the frequency is raised true reflection ceases and communication is almost entirely confined to quasi-optical conditions. The laws governing the propagation of light-waves apply more exactly to very high frequency (V.H.F.) and ultra high frequency (U.H.F.) R. waves. The science of forecasting ionospheric conditions to determine the optimum frequency for a given path of communication for a particular season and time of day has become highly specialised in recent years. The main disturbing influences on short-wave R. are magnetic storms which have their origin on the surface of the sun. Their source is often visible from the earth as 'sun spots,' and it has been found that, when these appear, they produce streams of charged particles which, when they reach the reflecting layers, completely alter their normal characteristics and prevent the reflection on which short-wave R. depends. The effect can be most severe and results in a complete fade-out of long-distance signals which may last an hour or occur intermittently for sev. days. Their occurrence is, however, infrequent.

How Sound is sent and received by Radio.—It has now been shown that there is a

chain of circumstances which must exist to enable words, music, or other intelligence to be conveyed by it. The sound is produced in the studio and is picked up by a microphone (*q.v.*), it is amplified (see **AMPLIFIER**) and modulates (see **MODULATION**) a transmitter (*q.v.*) which delivers modulated R. frequency power to an aerial system. If the correct frequency has been used the R. waves will arrive at the aerial of the receiving station where they will induce in it a R. frequency voltage similar, but infinitely smaller, than that which left the aerial of the transmitting station. The receiving aerial is connected to a receiver which can be 'tuned,' or, in other words, made to respond only to the frequency of the wanted incoming signal. The receiver amplifies the signal, and finally removes from the R. or 'carrier' wave, as it is called, the intelligence which was impressed upon it by the sounds from the studio. This intelligence, which is now an audio-frequency voltage, is again amplified and passed to a loud-speaker (*q.v.*), which delivers sound-waves that can be heard by the human ear. See **RADIO RECEIVERS**.

V.H.F. Mobile Radio Systems.—So far only broadcasting and fixed communication have been considered, but R. has a number of other applications which are no less important. Much development has taken place in the field of V.H.F. radio communication, and this has found very practical expression in the R. telephony networks used by police, fire services, taxi companies, and others. The frequencies employed are, as a rule, between 70 and 200 Mc./s., and amplitude modulation (A.M.) and frequency modulation (F.M.) are in use (see **MODULATION**). It is usual for a fixed headquarters station to be in communication with mobile stations fitted in cars, etc., whose movements it controls. The control station is invariably situated on high ground to give the widest service area, since it is the ground wave that is important for communication. The service area is sometimes extended by the use of relay or 'slave' transmitters located outside the coverage of the main station. Where a slave is used its frequency is locked closely to that of the main station so that no retuning need be done by the mobile receiver when passing from the service area of the control to the slave transmitter.

Direction Finding.—R. direction finding (*q.v.*) has been used as a navigational aid for many years both for ships at sea and aircraft. Some of its uses, however, have been superseded by Radar, but it still has important aspects.

Radar.—By means of Radar exact information can be obtained regarding the position of ships and aircraft without the necessity of their having to transmit R. signals on which bearings, etc., are taken. Conversely ships can obtain their positions relative to land, buoys, and other vessels by its use, and navigation through fog and bad visibility is thus shorn of many of its dangers. A continuous Radar chart can be presented to the navigator as distinct from bearings obtained inter-

mittently using a direction finder, as Radar gives, not only an azimuth bearing, but an accurate range of all surrounding objects simultaneously. There are other applications of Radar (*q.v.*). See **NAVIGATION**.

Radio Frequency Heating.—Apart from communication and navigation, R. has proved itself capable of serving mankind in other ways. R. frequency heating (*q.v.*) is used for local heating of objects not amenable to the more commonplace methods. The R. valve-making industry itself, for example, uses it to rid heat the component parts of a valve after assembly and inclusion in the glass envelope which would be impossible by other means. The output from a R. frequency generator is led to a coil which is placed over the valve envelope and the high-frequency currents induced in the metal assembly of the valve by it causes them to become heated to a temp. at which they will give up any occluded gases which would be detrimental to the working of the valve subsequently. Such methods are used for hardening gear teeth, joining plastics, and even cooking food.

Diathermy.—The medical profession, too, employs R. frequency generators to give diathermy treatment to patients suffering from deep-seated ailments which do not lend themselves to other forms of heat application or to operation. The generator is connected either to the two plates of a condenser, between which the area to be treated is placed, or to a coil which can be placed over the part if it be an arm or leg. Both methods of application subject the part under treatment to a high R. frequency field of energy, so that the dielectric losses caused by the flesh and bone appear as heat. This heat is produced not on the skin surface but throughout the treated part and is very deep-seated in origin. Thus the healing effect of heat can be produced inside the part of the body where it can do most good.

Television.—One of the most popular uses to which R. has been put, and one which promises to play an increasing part in the daily life of the community, is television (*q.v.*). It has for many years been possible to send pictures by R. and, indeed, the press relies on such a service for much of its picture material from abroad. While many of the aspects are akin to television, the process of transmission is relatively slow, and it may take some 20 min. to transmit a complete picture. The picture transmission service, however, is applicable to the normal communication systems, while television is not. By virtue of the fact that in television the process of picture transmission has to be speeded up to give a continuously repeated picture which is completed twenty-five times per second, it will be seen that the amount of intelligence to be conveyed by this means is many times greater than that for press picture work. This necessitates the use of a wide band of frequencies which are only available above about 30 Mc./s. In the United Kingdom the band 40-70 Mc./s. is used, and each station may

require some 4 Mc.s. to enable the picture and its accompanying sound to be transmitted.

Other uses for R. are appearing with great rapidity as time goes on, and its potentialities are by no means fully explored, so that further advances may be confidently foreshadowed in the years to come.

See A. S. Ranshaw, *Radio, Television, and Radar*, 1945; M. Shurzberg and W. Osterheld, *Essentials of Radio*, 1948; R. W. Hallows, *Wireless Simply explained*, 1949; M. Gorham, *Television*, 1949; and H. E. Penrose and others, *Outlines of Radio*, 1949.

Radioactivity refers to the phenomena that accompany the spontaneous transmutation of unstable elements. There is a fairly large number of radioactive substances, classified in three distinct families—the uranium family, the actinium family, and the thorium family. Besides the substances included in the above groups, the elements potassium and rubidium are feebly radioactive. The phenomenon was first discovered in 1896, when Becquerel observed that some photographic plates, although securely wrapped up, became fogged when placed in close proximity to certain uranium compounds. A closer investigation showed that thin metal coverings were unable to protect the plates against this fogging. It was supposed that the uranium compounds emitted some radiations, known at that time as Becquerel rays, that were able to penetrate such coverings opaque to ordinary light. Becquerel's discovery of this natural phenomenon closely followed Röntgen's discovery of X-rays (q.v.), and since the fogging of photographic plates was common to both these new types of rays, intensive research was begun on the compounds of uranium. M. and Mme Curie soon succeeded in isolating a new element far more active, in the sense described above, than the original uranium. This element was named polonium; shortly afterwards, by a brilliant piece of chemical research, they separated another new and much more powerful radioactive element, radium. While research was continued, with the result that the actinium and thorium families were discovered, attention was directed to investigating the nature of these mysterious radiations. It was found that they caused certain substances, notably barium platinocyanide and zinc sulphide, to phosphoresce, just as X-rays did, but in 1899 Rutherford made the first of a series of important discoveries that made him the foremost investigator in this branch of physics. He found that the radiations from these substances were complex in character. Some of the rays were absorbed by very thin screens of paper or by a few centimetres of ordinary air; to these he gave the name α -rays. The more penetrating radiation that could pierce metal sheets of aluminium sev. millimetres thick he called β -rays. There remained a third type of radiation that Villard first discovered could penetrate thick blocks of aluminium and even layers

of lead sev. centimetres thick that easily absorbed both α - and β -rays; to these the name γ -rays was given. Subsequent research has failed to identify any other types of radioactive rays.

α -Rays are now known to consist of material particles carrying a positive charge of electricity. They are the nuclei of helium atoms (see NUCLEUS), and they are expelled from radioactive substances with a velocity of the order of 10,000 m. per sec. The charge carried by an α -particle is equal in magnitude to twice the charge on an electron. α -particles will penetrate only a few centimetres of atmospheric air before being reduced to rest.

β -Rays are also material particles. They are electrons, and have therefore a mass only about $\frac{1}{1836}$ that of the lightest atom known, hydrogen. The velocities with which they are expelled from radioactive substances are enormous, the fastest β -particles known having velocities approaching 186,000 m. per sec., the velocity of light.

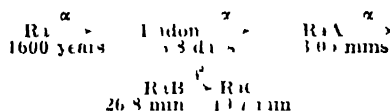
γ -Rays are not material particles. They are light rays of very high frequency. Light waves in the visible spectrum have wave-lengths of the order of 10^{-5} cm.; X-rays have wave-lengths of the order of 10^{-8} cm.; the hardest γ -rays have wave-lengths of the order of 10^{-11} cm., and they are the shortest waves known, being at the opposite extreme of the scale of electromagnetic waves from the long wireless waves.

α rays can be deflected by intense magnetic fields that deflect β -rays in the opposite direction, a fact that led to the discovery of their real nature, but γ -rays do not suffer such a deflection.

Rutherford and Soddy's Theory of Radioactive Disintegration.—The three types of radiation from radioactive bodies have one feature in common: they ionise the air they traverse by knocking out one or more electrons from the atoms of the gas. This led to an easy method of determining the intensity of such radiations by measuring the degree of ionisation produced by means of a sensitive electrometer (q.v.). Rutherford and Soddy found that the 'activity' of any radioactive substance gradually decreased according to a definite law. If T_0 is the measure of this activity at some arbitrary zero of time, then after a time t the activity was found to be given by $T = T_0 e^{-\lambda t}$. The theory they proposed was that the activity was directly proportional to the number of radioactive atoms breaking up per second. In other words, in the notation of the differential calculus if N is the number of radioactive atoms present in a sample of the substance at any time t , then $N = N_0 e^{-\lambda t}$, where N_0 is the original number of radioactive atoms, and we deduce by simple differentiation of this last equation with regard to the variable t , $\frac{dN}{dt} = -\lambda N$, i.e. the rate of decrease of the number of radioactive atoms in any sample is directly proportional to the number of such atoms present. This law of radioactive disintegration is simply a

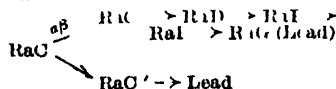
law of probability, that is the disintegration of radioactive atoms is spontaneous and governed only by the laws of chance. No known chemical or physical agency can control increase, or diminish the rate of this disintegration. If radium, for example, is subjected to fierce heat or the extremities of cold produced by immersion in liquid hydrogen, the disintegration is not affected. Or, again, if radium is caused to enter into chemical combinations to form radium salts such as radium bromide or radium chloride, the rate of disintegration is not affected.

Rutherford and Soddy's law is found to hold good also in more complex cases where several radioactive substances are present at the same time and there is no doubt that the phenomenon of it is the witnesses of the breaking up of individual atoms. It is illuminating to follow out the series of radioactive transformations that takes place in the uranium family. The disintegration of the original parent uranium takes place slowly. After 4.5×10^9 years it has only run half its course, so that the original amount of uranium half remains after that length of time. After many generations we arrive at radium. It must not be supposed that we have to wait all that time before any radium appears. Some radium will be present in any sample of uranium but the amount is infinitesimal (Radium). The first disintegration of radium then proceeds as follows:



Leading from the left we see that any sample of radium is only half exhausted after 1600 years. An atom of radium breaks up by the expulsion of an α particle producing a new element known as radon (or radium emanation), a chemically inert gas that is itself radioactive.

Any sample of radon is half exhausted after 3.8 days; an atom of radon breaks up by the expulsion of an α particle to produce a new radioactive element, RaA. The table can then be followed until we come to the intensely active substance RaC. Thereafter the series continues as follows:



Thus the end of these performances is the formation of lead.

The importance of the study of R can not be over estimated. It led to the formulation by Rutherford of the nuclear theory of the atom, and it has resulted in the discovery of the nature of atomic nuclei. Radioactive substances provide evidence of their own nuclear structure by their disintegration, but the commoner elements are more stable, and their nuclei

cannot be broken up by ordinary means. A close study of the tracks made by α particles rushing through gases has revealed the information that these fast-moving 'bullets' rarely collide with any material part of the gaseous atoms. Only about 1 α particle out of 10,000 makes a direct hit on a nucleus of such gaseous atoms. The only possible conclusion from such evidence is that an atom is very largely empty space. The central nucleus with its positive charge is separated by relatively enormous distances from its orbital electrons. Researches initiated by Rutherford and C. L. R. Wilson and carried on by Blackett concentrated on the tracks of these direct hits so rarely registered by an α particle on a atomic nucleus. They found that in such cases the nucleus broken up by the collision, that the nuclei of all atoms consist of a collection of protons and neutrons.

Rutherford computed by direct counting that an gramme of radium yields no fewer than 3×10^{10} α particles per sec. The exact cause of the disintegration of radioactive atoms is not known. It must be due to an inherent instability of the collection of protons and neutrons that form the nucleus of such an atom. That the upheaval that accompanies the disintegration is colossal is seen from the speed with which α and β particles are driven out. Actual human observation is not possible; the minute flashes of light that occur in a sample of such a substance are enough to pick up in the darkness, and 10^{10} atoms per gramme of radium break up per second but the disintegration is beyond our control. There comes a time when the nucleus is no longer stable, its internal formation it becomes unstable, and it is so minute that the expulsion of an α particle into a new nucleus but the nucleus is exhausted up to that crisis is as yet unknown.

In recent years it has become possible to produce streams of atomic nuclei traveling at speeds as high as even much higher than those of α particles, and these particles can be used to produce by collision with other atoms, transformations similar to those due to collisions of α particles. Moreover since many times more particles can be provided it is possible to produce the transmuted atoms in quantities that if small are nevertheless sufficient to be put to use. Much larger quantities of transmuted atoms can be obtained by bombarding materials by streams of neutron β particles, whose mass is similar to that of the hydrogen atom but which since they bear no electric charge, are capable of penetrating readily into the charged nuclei of atoms. The products of such changes are some times merely atoms of the same kind as have long been familiar to scientists, but frequently atoms are produced which while chemically similar to those normally found in nature are yet unstable, and so radioactive. In this way it is possible to produce, for example, radioactive sodium and phosphorus and other elements that are found in the living body. Extremely minute quantities of radioactive materials

can be detected by suitable electrical apparatus, and by introducing small quantities of such materials as radioactive phosphorus into food it is possible to follow the course of the chemical changes undergone by the same element in the living body. The potentialities of such experiments are immense, and are likely to lead to an enormous increase in our knowledge of biological processes.

See also ATOM AND ATOMIC THEORY; ELECTRON; PROTON; NUCLEUS; RADIIUM. The classic work on the subject is *Radiations from Radioactive Substances* (1930) by E. R. Rutherford, J. Chadwick, and C. D. Ellis. See also M. Curie, *Traité de radioactivité*, 1910, and J. Chadwick, *Radioactivity and Radioactive Substances*, 1928.

Radio-Astronomy, see RADAR, *Astronomy*.

Radio Direction Finding is the name applied to the science of using a radio receiver with a special aerial system to determine the direction of arrival of radio waves. It should not be confused with RADAR (q.v.), which is a specialised version of R. D. F. not involving the co-operation of the wireless station to be located. R. D. F. is mainly of use as an aid to the navigation of ships and aircraft, and equipment for this purpose is invariably carried nowadays in vessels of any size and all passenger-carrying aircraft. The action of a direction finder depends upon the specialised properties of the aerial system associated with it. Any aerial other than a plain vertical wire will receive more efficiently from some directions than from others, and there are directions from which reception may be a minimum. By suitable aerial arrangement this minimum can be made extremely well defined, and for this reason the minimum is invariably used for bearing determination in preference to the maximum. The indicator from which the bearings are determined in simple direction finders is a plain azimuth scale oriented with true N. and marked in degrees over which swings a pointer attached to the rotating aerial system. The null signal position is determined either on headphones or a signal strength meter associated with the automatic volume control circuits of the receiver. The simplest arrangement consists of a loop aerial free to rotate about a vertical axis, and coupled through a suitable balancing circuit to the input of a radio receiver. The polar diagram or electrical response of a loop aerial is a simple cosine or figure eight with two minima 180° apart. If a vertical aerial is combined with the loop in the correct phase relationship a cardioid pattern with only one minimum will result. Greater accuracy still is given by the spaced loop direction finder, which has the two loops mounted in a vertical plane at either end of a swinging beam, whose direction can be related to an azimuth scale. For medium and long-wave direction finders the Bellini-Tosi crossed loop direction finder has been in use for a number of years.

Where space is available, and a per-

manent direction finding station is required, the Adecock direction finder offers a high degree of accuracy with ease of control. The signal between spaced vertical aerials is compared by means of a radio goniometer and the design eliminates, as far as possible, all signal pick-up by the horizontal elements interconnecting the vertical aerials by the expedient of burying the feeder lines in the earth to a depth of sev. feet. Sev. semi-automatic direction finders have been developed based on the Adecock system, one of the most noteworthy being the spinning goniometer cathode-ray direction finder. With this can be associated the radio compass, for on both types a direct indication of bearing is available either on an oscillograph or phase meter suitably calibrated in azimuth bearings. Like all forms of measurement direction finding is liable to errors which the more highly developed and complicated equipments mentioned have been designed to minimise. The simple loop can determine with fair accuracy the direction of signals arriving normal to its axis of rotation, but it cannot discriminate signals arriving along its axis. Thus signals in which the vertical component is of any magnitude produce poorly defined or flat minima with resulting inaccuracy. Large metal objects or trees or buildings introduce errors by distortion of the wave front adjacent to the direction finder, and for this reason careful siting of a direction finding station is essential. In general a fixed direction finder has an accuracy of the order of one degree, while in a mobile direction finder two degrees are more usual. An important application of R. D. F. is that of aircraft blind-landing systems, of which there are sev. These rely on radio signals sent out from aerials at the airport in sharply defined directions, so that an aircraft can follow them in by travelling along the beam of radio waves so formed. In addition vertical beams are made to intercept the main navigational beam to indicate to the pilot his distance from the point of landing. The beams themselves are modulated so that they may be identified as to their particular purpose. In this way a pilot in fog or bad weather can be brought into the beam and thereafter bring his aircraft down to reach the end of the runway by the correct use of the radio signals sent out from the system. Although the applications of R. D. F. are many and varied they all depend basically for their working on the directional properties of aerial systems, which in themselves often become highly complex, especially as the frequency becomes higher and the physical size of the aerial decreases. See R. Keen, *Wireless Direction Finding*, 1937.

Radio Drama, term applied to forms of dramatic writing intended for, or adapted to, broadcast production. In the early days of broadcasting it was found that of all types of broadcast programme drama required the most careful adaptation to the medium. The broadcast of the stage production of a play is liable to become

bewildering to a listener who cannot see the action fitted to the words. New techniques of writing and production were developed, and what was virtually a new art form came into being. Valuable work was done by the 'Columbia Workshop' studios in the U.S.A. In Great Britain, after ten years of broadcasting, R. D. reached a degree of elaboration which made Brit. broadcasting prominent in this field. This result is to be credited to the invention of the dramatic control panel. The various parts of a play, pieces of dialogue, sound effects, music, etc., may be enacted in separate studios, and the producer operating the dramatic control panel is able to bring to the listener the output of each studio either in sequence or simultaneously as may be required in presenting the play as a whole. This is known as the multiple studio technique. The process of switching from one studio to another, the equivalent generally of changing from one scene to another, is called the 'fade,' sound being faded in or faded out, abruptly or gradually, as the action of the play may demand. In an early radio play by Val Gielgud entitled *Ecceles*, broadcast by the B.B.C. in 1930, as many as eight studios were used. The technical possibilities of R. D. were so tempting in the early days of experiment, a period which may be put, say, between 1928 and 1935, that there was some danger of over-elaboration. This brought a reaction, partly one of taste, but mainly in Great Britain the result of broadcasting under wartime conditions from 1939 to 1945. Simplification became a practical necessity. At the same time the potential audience for R. D. enormously increased. During the war years many other forms of entertainment were curtailed with the result that more and more people turned to broadcasting to satisfy their interest in plays of all kinds. R. D. gained, and has since kept by its merits, a popularity which would have seemed visionary to the experimenters who laid the foundations in the early thirties. While some forms of drama are more appropriate to the stage than to radio it is equally true that there are other kinds for which broadcasting is a more effective medium than any other. Fantasy, expressionistic drama, the play of illustrated discussion, find a natural medium in radio. The opening of a radio play should be such that interest is aroused at once. Time and place must be clearly 'exposed,' and all characters should be easily identifiable throughout. The play is likely to be most successful which proceeds surely from its initial action through a series of well-conceived minor climaxes to a major climax. Among other technical requirements are the following. Entrances and exits may be covered with lines or sound. Attention should be adequately motivated. As a rule short speeches are preferable, and the style of writing should be taut and to the point. There should be no unnecessary characters. In a stage drama the audience may be easily transported from one scene to another by visual representation. In R. D., while there is no

limit to the scenes in which the action may be laid, the producer has the problem of deciding the technique he should employ to direct the imagination of the listener. Sound effects, informative dialogue, music, or narration may be employed, or any combination of these. Ideally each of these techniques has its particular application. Sound effects are often useful to indicate either a change of locale, or the movement of characters from one scene to another, but too great a dependence on their efficacy may weaken their dramatic purpose. Music is invaluable for giving the desired emotional tempo, and in many successful radio plays, e.g. *Music for Miss Rogers* (1941) by Margaret Gore Brown, and *Music at Dusk* (1939), by Val Gielgud, it is used as an intrinsic part of the action rather than as an extraneous device. In some types of play narration is the only right means of setting the scene and linking the action; in others it is a confession of defeat. To be suitable for broadcast transmission a play should have a plan as definite as a proposition in Euclid, for the producer can hardly create an effective programme in sound unless he is clear on the plan. Having clearly ascertained the outline of the plot the producer can proceed to plan the pacing, tempo, and interpretation of the whole play on that basis, making evident which scenes are merely expository, imparting facts which the audience need to know, and which are vital in the element of conflict in the drama. It is from this study of structure that the producer arrives at his conclusions about characterisation, interpretation, and casting. Many broadcast plays are, of course, plays originally written for the stage and adapted to the new medium, but many are written in the first instance as radio plays. A number of writers, among whom may be mentioned Philip Wode, Du Garde Pech, Mabel Constanduros, and Norman Edwards, have gained a reputation principally as radio playwrights, while many others, whose main effort lies in other directions, have experimented successfully in this medium. In late years also R. D. has given a new-found popularity to the play in verse, and in this connection mention may be made of the work of Louis MacNeice, Geoffrey Bridson, and Edward Sackville West. See Val Gielgud, *How to write Broadcast Plays*, 1932, and *Radio Theatre*, 1916; H. Thomas, *How to write for Broadcasting*, 1940; and F. Felton, *The Radio Play*, 1949.

Radio-facsimile Newspapers, see under NEWSPAPERS.

Radio-frequency Heating, production of heat in materials by the application to them of electromagnetic fields of frequencies similar to those used in radio transmission. The process is applicable to metals and also to non-conductors of electricity. For the heating of metals the object to be heated is placed close to a coil in which is generated a periodic magnetic field of suitable frequency; currents are then induced in the object, and are practically confined to the surface layers nearest the coil. In this way very intense local

heating can be produced in a period of a second or so, and the surfaces of tools, gear wheels, etc., can be made white hot and then rapidly cooled and hardened, without appreciable heating of the objects as a whole; the process is therefore rapid and economical, and causes no risk of distortion of the objects to which it is applied. Non-conductors that are to be heated are placed between the plates of an electric condenser, and a high-frequency alternating electric field is generated between the plates. Some of the power supplied electrically is converted into heat in the body of the non-conductor, the rate of generation of heat being characteristic of the material, and dependent also on the strength of the applied field and its frequency. This process is particularly useful in that it can be used to heat poor conductors of heat throughout their bulk, and so avoid the long delay that occurs if heat is to be conducted to them from their outer surfaces; it is employed therefore for purposes such as that of heating thermoplastic materials (see PLASTICS) to bring them into a condition suitable for moulding. A further advantage is that the heating of non-conductors, like that of metals, can be highly localised within the space between the electrodes, so that processes akin to the soldering and welding of metals can be applied to thermoplastic materials. R. H. is also applied to the drying of certain porous materials; because heat is generated throughout the material, and lost from the exterior only, the interior becomes hotter than the outside, and the water is expelled by the higher steam pressure within. For ordinary purposes R. H. is expensive, and costs sev. times as much as heating by conventional methods, but it has proved a valuable tool for special applications, such as those enumerated above. See L. L. Langton, *Radio-frequency Heating*, 1949.

Radiography, see RADIOLOGY; VACUUM TUBES; X-RAYS, also MASS RADIOGRAPHY.

Radiolaria, order of rhizopod Protozoa with numerous long and slender pseudopodia which issue from the body mass in a radial direction. They are closely related to the Foraminifera, from which they differ by forming their shells and skeletons of silica and arcanthol. The shell contains the inner part of the protoplasm, which communicates with the outer part through pores. The skeleton in some species is merely a series of needles embedded in the protoplasm, but in others is connected to form beautiful designs. Existing forms mostly live far from land in the tropical oceans, and as they die their shells collect in vast deposits of radiolarial ooze, which, when cemented into rock, forms beds of chert. They have been found alive at greater depths than 500 fathoms.

Radiolocation, see RADAR.

Radiology, in its widest sense, is the science of emanations, but the term is usually restricted to the science concerned with the production and use of X-rays (q.v.). During his investigation of cathode rays Röntgen (1895) discovered certain rays able to penetrate glass and metal, to

act on photographic plates, and to cause certain salts to fluoresce. These rays, named X-rays, have proved invaluable to doctors and surgeons in aiding them to diagnose, from radiographs of the affected parts, many 'internal' afflictions. The essential part of the X-ray apparatus is the focus tube, and many forms of this are in use. The tube, made of glass, tungsten, or molybdenum, is fitted with one or more anodes inclined at an angle of 45° to the axis of the tube. Electrons are emitted from a heated tungsten filament and, after being accelerated to a high speed, fall on the anode where they produce X-rays. These diverge and pass out through the glass. A radiograph showing the bones may be obtained by interposing a hand or other bony part of the body between the tube and a sensitised plate. Considerable danger, often resulting in loss of life, attended the use of these rays during the first thirty years after their discovery. Owing to the adoption of recommendations of the Brit. X-ray and Radium Protection Committee, radiologists may now safely pursue the science. Great advances have been made in the use of these rays by the medical and dental professions. Radiological diagnosis, not only of diseases and deformities of bone, but of certain affections of the circulatory, respiratory, digestive, and urogenital systems may now be made after appropriate impregnation of the cavities or tissues with substances rendering them opaque, and so making it possible to obtain radiographs of them. See also MASS RADIOGRAPHY. See J. W. McLaren (ed.), *Modern Trends in Diagnostic Radiology*.

Radiometer, instrument devised by Sir W. Crookes, 1873-76, consisting of four very thin disks of glass, mica, or metal carried on aluminium arms at right angles to each other, and pivoted so as to rotate with as little friction as possible in a glass globe partly exhausted. The disks are coated with lampblack on one side so that on rotation bright and black surfaces succeed each other alternately. On exposure to a source of light or heat the black surfaces absorb heat in greater quantity, and their temp. is raised; the molecules of air coming in contact rebound with greater energy, and the greater reaction between the molecules and the black surfaces causes the disks to rotate, their black surfaces receding from the source of radiant energy. The speed of rotation increases with exhaustion up to a maximum, slackens, and finally stops with further exhaustion.

Radio-micrometer (electricity), combination of thermocouple and galvanometer, devised by D'Arsonval and C. V. Boys, and used for detecting and measuring feeble radiation, such as that received from heavenly bodies.

Radio Receivers. Modern R. R. exist in a large number of versions but are of three main types. The purpose of a receiver is to accept a desired radio signal to the exclusion of all others, to amplify it so that the intelligence may be abstracted from it, and finally, when this is

done, to present the intelligence in a form in which it can be used. To do this the radio signal must be selected, amplified, detected, or demodulated (*see* MODULATION) and the audio frequency output passed to some form of transducer. The simplest receiver consists of a tuned circuit (coil and condenser), a signal rectifier, and a pair of headphones. The non linear electrical characteristic of the rectifier (which may be german, germanium, or a diode) serves to demodulate the carrier wave, passing the audio component to the headphones as shown. The advent of the valve (*q.e.*) revolutionised receiver design and made it possible to increase sensitivity by means of amplifying stages so that very weak signals could be picked up. These 'straight' or tuned radio frequency receivers as they are called consist of three separate parts, namely, a radio frequency amplifier, a signal detector, and an audio frequency amplifier. Such receivers, while possessing a high degree of sensitivity, are relatively unselective, i.e. they are not able easily to discriminate between a wanted station and one on an adjacent frequency. An increase in selectivity with such a receiver is complicated, involving as it does many circuits which must be capable of being tuned to the signal. To-day, however, nearly all receivers are of the superheterodyne type (superhets). In these a frequency changer is employed in which the wanted signal is mixed with a locally produced signal to give two products, one being a signal of frequency equal to the sum of the frequencies of the wanted station and the local oscillation and the other being the difference between them. One of these products is fed to a fixed tuned amplifier known as the intermediate frequency or I.F. amplifier. All incoming signals are converted to the I.F. by keeping the local oscillator in step, but separated from the signal frequency by an amount equal to the I.F. The advantage is that the I.F. can be pre-tuned and made both sensitive and selective. In this way the receiver is easily controlled and is more efficient than its tuned radio frequency counterpart. A broadcast receiver must not be too selective or the quality of the received music or speech will suffer, but there is another class of receiver for communications work where output quality is of secondary importance compared with its ability to discriminate against unwanted signals and noise. It must have a sensitivity of a few micro-volts and be able to reduce interference from a station separated by only a few cycles from the wanted one; it must be able to receive both telephony and telegraphy signals and feed its output either to a loudspeaker or headphones. To do this such a receiver will generally have one or two tuned radio frequency amplifiers before the frequency changer stage, then one or more stages of I.F. amplification, a detector diode and another diode for developing automatic volume control (A.V.C.) voltage, and, finally, one or two audio frequency stages. The normal upper frequency limit of

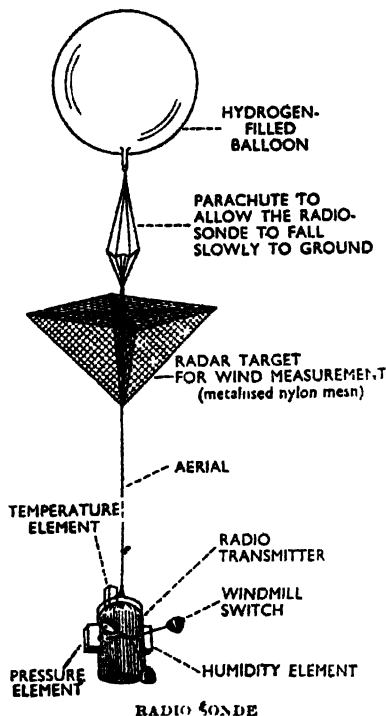
such receivers is around 30 megacycles, and above this special variations of the normal superhet technique are encountered. The process of frequency changing is often carried out twice with two separate I.F. amplifiers of different frequencies to give adequate gain and selectivity. Crystal mixer stages, grounded grid triode radio frequency stages, and special valves have all made their appearance recently and superhet development for very high frequency (V.H.F.) use is advancing rapidly to keep abreast with present-day demands. The early type of receiver for V.H.F., the super-regenerative detector, has now largely disappeared because of its inability to give adequate selectivity and its inherent noise. It also suffered from bad radiation and it emitted a rough signal of its own unless suitable precautions were taken.

Television receivers call for separate consideration since they must accept wide bands of frequencies equally and are reviewed under TELEVISION.

Radio-sonde, instrument-carrying free balloon which measures the state of the atmosphere at different levels and transmits the information to the ground by means of radio. The normal weather elements measured are pressure, temp., and humidity. In addition, the R.-S. may be traced by direction-finding radio or radar methods, thus determining the winds at levels traversed by the balloon. In 1915 the first attempts were made in France to transmit data from captive balloons, but without much success. Further attempts were made in Germany and America with free unmanned balloons, with only limited success; and in 1927, using transmitters on a wave-length of 42 m., with good success by the Frenchmen, Idzac and Bureau. These were experimental balloon ascents. The first ascents made immediately available for practical use were, however, in Jan. 1930, when Moltchanov succeeded in obtaining data from balloons which penetrated into the stratosphere above Slutsk in Russia. Further improvements followed rapidly in many countries, the main developments being by P. A. Moltchanov in Russia, Lt. Bureau in France, P. Duckert in Germany, V. Väisälä in Finland, at the Blue Hill Observatory, Harvard Univ., and by H. A. Thomas in England. With the outbreak of war in 1939 mass production began to be achieved.

Pressure is measured in all R.-S. by means of a lever mechanism attached to an aneroid capsule. Temp. is usually measured by a bimetallic coil connected to a lever, but in some of the later instruments the variation in electrical resistance of a metal or liquid is used. Humidity measurements are still unreliable owing to time-lag and hysteresis, the usual methods being the variation in length of human hair or gold-beater's skin. The observations are transmitted to the ground by a variety of methods. In 1923 Moltchanov began experiments with a method in which layers from the meteorological units are allowed to slide over a system of

contacts rather like the teeth of combs. Each comb is connected to a simple rotating mechanism (which may be driven by clockwork) so that an identifying letter in the morse code is heard corresponding to the comb or combination of combs in contact. The actual values of the temp., pressure, and humidity are recognised by knowing the order in which the levers make contact with the combs as the temp., pressure, and humidity change. This



type of R.-S. is known as 'Kammigerat,' after the Ger. word for 'comb.' Other types of R.-S. work on a chronometric principle. By means of a revolving cylinder or rotating arm a signal may be transmitted from fixed reference points or moving levers from the meteorological instruments. The time between a fixed-reference signal and a signal from a contact with, say, the pressure lever, depends on the speed of rotation of the cylinder or arm and on the distance between the fixed reference and the lever. This time can be measured mechanically and calibrated to give a measure of the pressure or any other element. The main difficulty in this type of R.-S. is in obtaining a cheap clockwork mechanism that works at a uniform speed in widely varying

atmospheric temps. Many R.-S., including the instrument in use in the Brit. Meteorological Office, convert the values of pressure, temp., and humidity into varying musical notes (audio frequencies) which after transmission by the R.-S. can be measured at the surface. The first Brit. instrument, invented by Thomas, transmitted two notes together, one for pressure and one for temp., the frequencies being measured by ear at the ground. This was unsatisfactory and the present Meteorological Office R.-S. has a windmill-operated switch which allows each element to be broadcast in turn. An Amer. instrument omits the windmill and audio-frequency circuit for pressure incorporating instead a pressure-switching device which, at known pressures, changes from temp. measurement to humidity measurement or occasionally to fixed references, and back again at other known pressures. The audio frequencies from the Brit. R.-S. are compared individually with a controlled frequency by means of a cathode-ray oscillograph. In a very similar Finnish R.-S. invented by V. Vaisala, and in the Amer. type, the frequencies are plotted mechanically on a chart.

Radar targets, consisting of three-plane metalised sheets or nylon nets arranged mutually at right angle are also attached to modern balloons so that the position of the balloon at any moment can be determined by radar. Since the balloon drifts horizontally only with the winds the winds at the various heights traversed by the balloon can easily be determined. The radar method has superseded direction-finding radio methods, because of greater accuracy and cheapness.

Rockets. Recently meteorological instruments have been attached to rockets of the V2 type. Much heavier instruments can be placed in the head of the rocket, but the speed with which the rocket is moving and the very low pressures at the heights reached add to the difficulties. Since the pressure varies from 1000 mb. at the surface to about 1/100 000 mb. at great heights the normal aneroid capsule fails and electrical gauges are used which depend on the variation in resistance of a hot wire at low pressures or on the variation of ionisation of the air at the lowest pressures. The temp. is measured by variation of electrical resistance or by thermocouples. Because of the high speed of the rocket and the difficulty of separating pressure and temp. readings, the pressure and temp. gauges are placed at varying points on the outer skin of the rocket and the true air pressure and temp. calculated from the gauge readings, using complicated formulae which include the velocity of the rocket. The velocity of the rocket is known because the rocket can be followed by radar, so that its position is known at all times.

Radio-therapy, see under RADIUM.

'Radio Times,' weekly journal of the Brit. Broadcasting Corporation, was first issued on Sept. 28, 1923, ten months after the beginning of an organised broadcasting service. The first issue sold 200 000 copies, and by 1933, when there were

7,000,000 licence-holders, a weekly sale of 2,500,000 copies was achieved. Before the introduction of paper rationing the *R. T.* had some eighty to eighty-eight pages, and contained complete sound and television programmes, with pictures, articles, and advertisements. Shortage of paper reduced the size, though by 1948 the weekly demand could be supplied, the contents being regionalised on the same scheme as was broadcasting, and an average sale of 7,000,000 copies being maintained. At first printed and pub. by George Newnes and Company Ltd., from 1937 it was printed by Waterlow & Sons Ltd., in specially erected works.

Radio Transmitting, see TRANSMITTER.

Radish, or *Raphanus sativus*, cruciferous plant, the root of which is a valuable salad plant; it has been cultivated from a remote period.

Radium (Ra, atomic weight 226.05, atomic number 88), element discovered by Mme Curie in 1898 when working with her husband on the radioactivity of uranium compounds. By testing the group precipitates of a complete analysis of pitchblende, an impure oxide of uranium, she found that the barium sulphate precipitate contained the active constituent and separated it by fractional crystallisation. She obtained radium chloride practically free from the barium salt. R. is similar in its properties (apart from its radioactivity) to the alkaline earths, calcium, strontium, and barium. The most profitable source of the element is pitchblende, and this is discovered in large quantities in Czechoslovakia at Joachimsthal. About 6 tons of pitchblende produce 1 gramme of R., a fact that accounts for the present price of £15,000 per gramme. Other sources of R. that are profitably worked are the Carnotite mines in Colorado and the Autunite mines in U.S.A. The metal itself may be obtained by electrolytic separation from R. chloride. It is white, resembling metallic barium, and melting at 700° C. It is rapidly attacked on exposure to air, and it is generally sold in the form of R. chloride or bromide, both white salts. The 'half period' of R. is about 1600 years, but the decay per annum is only about 0.04 per cent. The immediate product of its disintegration is radon, a chemically inert gas, and it disintegrates by the expulsion of an α -particle. The rate of its disintegration cannot be controlled by any chemical or physical agency (see RADIOACTIVITY). One gramme of R. emits more than 3×10^{10} α -particles per sec. and it generates 100 calories per hr.

The R. Institute in London was founded by Sir K. Cassel and Lord Iveagh, and the present supplies are sufficient for treatment in all large tumours. See also RADIOACTIVITY; RADON; URANIUM; X-RAYS.

Radio-therapy is the treatment of disease by means of X-rays and radium. The gamma rays from radium, which are those used therapeutically, consist of electromagnetic vibrations (waves) which are of the same essential nature as the 'hard' or 'deep' X-rays (i.e. those of very short wavelength); radium and X-ray

treatment are indeed to a certain extent interchangeable, and the same unit of dosage (the Röntgen) is used for both. Radio-therapy can be used in the treatment of various diseases, e.g. for ringworm, for removing scars (cholooids) resulting from burns, for epilation, etc., but its chief value is in malignant tumours (cancers). The different types of cancer (q.v.) vary in their susceptibility to radio-therapy, and moreover those which are highly susceptible may recur in other sites. Good results are obtained with cancers which are slow growing and moderately radio-sensitive, e.g. those of the face, lip, mouth, breast, bladder, and uterus. Surgery remains the best form of treatment in cancers of the stomach, intestine, and rectum; surgery and radio-therapy are frequently used in combination.

A radio-active isotope of iodine (I_{131}) undergoes absorption by the thyroid gland in the same way as ordinary iodine (I_{127}), and is now being used not only for investigating the function of this gland but for the treatment of malignant growths in it. See R. Paterson, *The Treatment of Malignant Disease by Radium and X-Rays*, 1948, and J. Walter and H. Miller, *A Short Textbook of Radio-therapy*, 1950.

Radius, in anatomy, is the smaller companion bone to the ulna in the fore-arm. Its larger end is attached to the wrist, the smaller to the elbow. The biceps muscle is attached to it just below the crook of the arm. Colles's fracture occurs at the wrist end, some $\frac{1}{2}$ in. from the articulation.

Radius, see under CIRCLE.

Radius of Gyration, in mathematics, is the distance from the axis to the point where the mass of the body is supposed to be concentrated. The moment of inertia is the product of the mass into the square of the R. of G.

Radius Vector, in astronomy, the line drawn from the controlling body at the focus to a planet or satellite, etc., in any position in its orbit. The motion in the orbit is such that the R. V. sweeps out equal areas in equal times.

Radley, vil. of Berkshire, England, 2½ in. N.E. of Abingdon. It is the seat of the well-known Church of England Boarding school, St. Peter's College, founded in 1847, incorporated in 1890, and accommodating some 400 boys. Pop. 600. See Lord Latymer, *Chances and Changes*, 1931.

Radnor, Earl of, Brit. title borne by the family of Robartes from 1679 to 1757, and subsequently by that of Pleydell-Bouverie. Wm. Bouverie, second Viscount Folkestone (1725-76), created Baron Longford in 1747, a wealthy Huguenot, was created earl of R. in 1765. His son Jacob assumed the name of Pleydell-Bouverie and his descendants still hold the title. The chief seat is Longford Castle, near Salisbury. The eldest son of the earl is called Viscount Folkestone.

Radnorshire (Sir Feasfyed), co. of S. Wales, bounded N. by Montgomery and Shropshire, S. by Brecknock, E. by Hereford, W. by Brecknock and Cardigan. Over one-half of the co. is 1000 ft. or more above sea level, the highest point 2166 ft.

on Radnor Forest. The prin. rivs. are the Wye and its tribs., and the Teme, all excellent for trout, and the Wye for salmon. The only important industries are agriculture, forestry, and quarrying; sheep-raising predominates. Presteigne (1250) is the co. tn., where the assizes have been held since 1542. Llandrindod Wells (1250), a noted spa, and entirely modern tn., has been the administrative centre since 1889. Knighton and Rhayader are important mkt. tns. Near the latter are the Elan valley reservoirs of the Birmingham Corporation (a miniature lake dist.). R. with Brecknock returns one member to Parliament. Welsh, which was the prevailing language up to about 1750, is now practically extinct. Area 470 sq. m. Pop. 20,000. See W. H. Howse, *Radnorshire*, 1949.

Radon, Niton, or Radium Emanation, unstable radioactive gaseous element, symbol Rn, atomic number 86, atomic weight 222. It is a colourless gas, boiling at about -62°C ., and rapidly disintegrates into helium and a radioactive solid (radium D). R. is used in radiotherapy, and is obtained by dissolving a radium salt in water. R. is spontaneously evolved by radium.

Radulescu, see HILADE-**RADULESCU**, JOAN.

Rae Bareli, see RAY BARELI.

Raeburn, Sir Henry (1756-1823), Scottish portrait painter, b. at Stockbridge, Edinburgh, and at an early age began to paint. Reynolds saw great promise in his work, and persuaded him to study abroad. R. settled in 1787 at Edinburgh, and soon acquired fame. All the Scottish notabilities of the day, except Burns, sat to him. In 1814 he sent a picture to the Royal Academy, and was immediately elected an associate, and in the following year a member. His work earned for him the title of 'the Scottish Reynolds.' See lives by W. E. Henley, 1890; his great-grandson, Wm. Raeburn Andrew, 1894; Sir W. Armstrong, 1901; and E. R. Diddin, 1925. See also the essay in R. L. Stevenson's *Virginibus Puerisque*.

Raeder, Erich (b. 1876), Ger. admiral. He joined the navy in 1894, and was chief of staff in the First World War. He took part in the battles of the Dogger Bank and Jutland, and in bombardments against the Brit. coast tns. He was made admiral in 1923, grand admiral in 1939, commander-in-chief of the Ger. Navy 1935-43, being superseded by Donitz (q.v.), inspector of war fleet from Jan. 1943, but was virtually in retirement after 1943. In the fifteen years during which he commanded it he built up and directed the Ger. Navy. At the Nuremberg trial he was sentenced (1946) to imprisonment for life.

Rafia, see RHAFIA.

Raffaello Sanzio, see RAPHAEL SANTI.

Raffles, see RAPHIA.

Raffles, Sir Thomas Stamford (1781-1826), Eng. administrator, founder of Singapore, b. at Fra off Port Morant,

Jamaica. He was educated in London, and in 1800 became clerk in the secretary's office of the E. India Company. In 1807 being appointed assistant secretary at the presidency of Penang. In 1810 he proceeded to Calcutta, where he remained four months, and persuaded Lord Minto that the conquest of Java from the Fr. was a necessity. In 1811 an expedition for this purpose was sent out, and on the conquest of the is. being completed, R. was made lieutenant-governor, remaining there until 1816, and ruling with conspicuous success. The following year he pub. his *History of Java*. From 1818 to 1823 he was lieutenant-governor of Sumatra, the E. India Company acquiring Singapore on his advice in 1819. See lives by H. Egerton, 1899; R. Conpland 1926, 1946; and Emily Hahn, *Raffles of Singapore*, 1947.

Rafflesia, genus of parasitic stemless plants, producing enormous flowers more than a yard across. *R. arnoldiana*, the finest species, is parasitic on the roots and trunk of species of *Clusia*.

Ragged Schools, institutions first begun by John Pounds, a Portsmouth schoolmaster, in 1820, which supplied free education, and sometimes bodily necessities for destitute children. Some regard Robert Ralke, who estab. the first Sunday school at Gloucester in 1790, as the pioneer of the R. S. movement in England. In Scotland Dr. Guthrie took steps in the same direction in the middle of the last century. After the foundation of the Ragged School Union in 1844 by Lord Ashley (subsequently the earl of Shaftesbury), agencies for the education of the poor, especially children, became a permanent element in Eng. social life, but with the introduction of free compulsory education in 1870 the work of the R. S. lost their importance.

Raghuvamsa (Sanskrit family of Raghu), epic poem by Kalidasa, describing the hist. of Raghu and his forefathers and descendants. It dates from about the fourth century A.D., and has been ed. repeatedly. See Eng. trans. by P. de L. Johnston, 1902.

Raglan, Lord Fitzroy James Henry Somerset, first Baron (1788-1855), Brit. soldier, the youngest son of the fifth duke of Somerset, b. at Badminton, entered the army in 1804, and four years later went to Portugal as aide-de-camp to Wellington, with whom he was officially connected for sev. years. He was wounded at Waterloo, and had his right arm amputated. He was military secretary at the Horse Guards from 1827 until 1852, when he became master general of the ordnance, and was raised to the peerage. He went to the E. in 1854 to command the Brit. troops sent against Russia in the Crimean War. He died of dysentery before Sebastopol, being, as Sir Evelyn Wood has written, 'the victim of England's unreadiness for war.' He was a fine soldier and an able administrator.